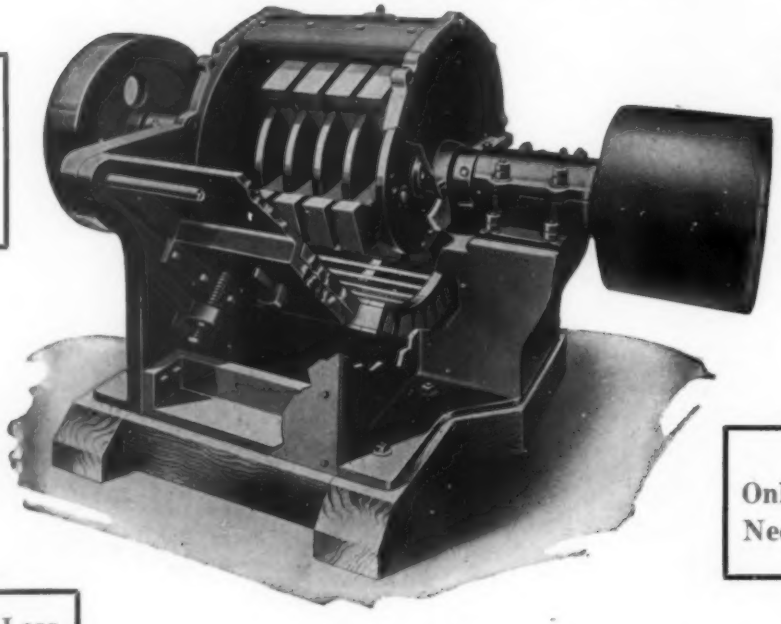
Handle Larger Rock

WHY MORE PLANTS ARE INSTALLING

• WILLIAMS •
HAMMER CRUSHERS

Better Control Over Size of Product

Reduces to Desired Size • • • in one operation

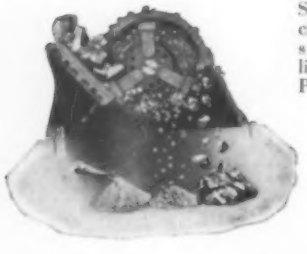


Jumbo Junior Crusher with section removed to show crushing parts.

Cubular Stone • • • No Slivers

Only One Crusher Needed for the Job

25% to 75% Less Investment • • • Cheaper Crushing



Sectional view of crusher used to show the Williams Hammer Principle of crushing.

If you plan additional rock crushing equipment investigate Williams Hammer Crushers. Usually one Williams will take the place of two or three other crushers at a considerable saving in investment and operating costs. Thirty sizes make it easy to select exactly the proper machine for your work. Large sizes handle power shovel loaded stone and crush to 2", 1¼" or smaller. Smaller sizes handle screen rejects or hand-loaded rock and reduce to 1¼", ¾" or agstone. Get our recommendations on your crushing, pulverizing, screen or air separation job.

. . . *Write for illustrated bulletins* . . .

The Williams Patent Crusher & Pulverizer Co.

800 St. Louis Avenue • ST. LOUIS, MO.

Sales Agencies in All Principal Cities Including

Chicago	New York	San Francisco
37 W. Van Buren St.	15 Park Row	326 Rialto Bldg.

WILLIAMS PATENT CRUSHER & PULVERIZER CO. ST. LOUIS, MO. U.S.A. THE TRADE MARK

REG. U.S. PAT. OFF.

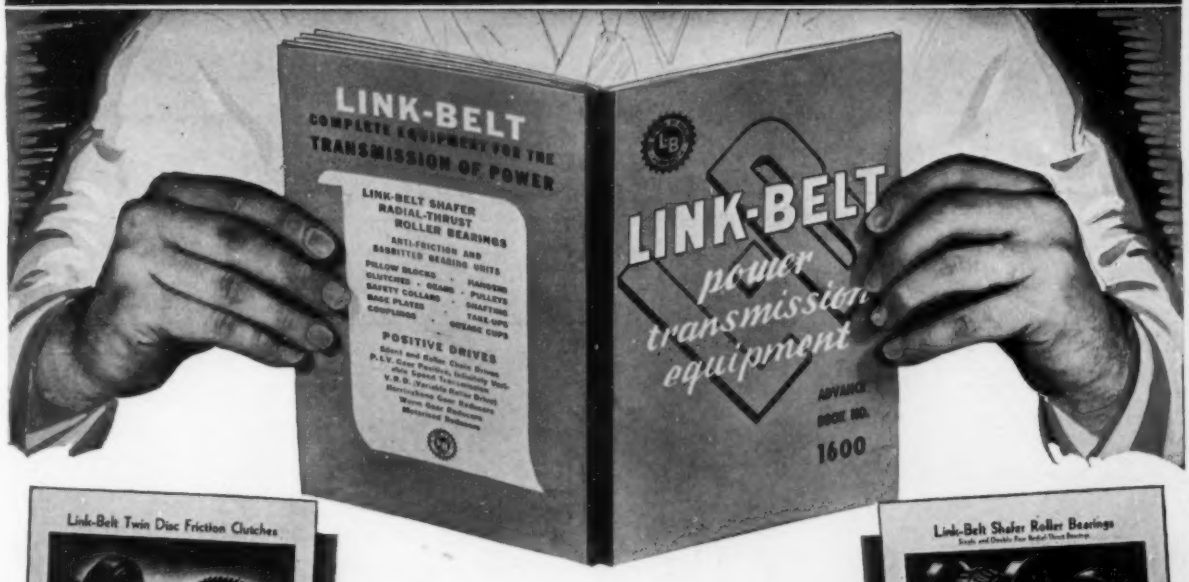
WILLIAMS

OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

WILLIAMS

PATENT CRUSHERS GRINDERS SHREDDERS

Use This New DATA BOOK as Your Power Transmission Guide



● Between the covers of this new book are presented in convenient, compact form, complete engineering and reference data on—self-aligning anti-friction ball and roller bearing units, newly designed for greater life . . . babbitted bearing units for every service . . . welded steel base plates . . . take-ups . . . friction and jaw clutches, including the famous Twin Disc line . . . cast and cut tooth gears . . . steel split and cast iron pulleys . . . safety collars . . . couplings, both flexible and rigid . . . drop hangers and hanger bearings . . . grease fittings . . . shafting—the latest designs of the leading manufacturer of power transmission equipment. The line that answers every need for dependable, low-cost power transmission service in all industries.

The book contains 272 pages of illustrations, dimensions, weights, list prices, engineering information, cross-indexed for convenient use. Ask the nearest office to send you a copy.

LINK-BELT COMPANY

Chicago Philadelphia Indianapolis
Atlanta San Francisco Toronto
Offices in Principal Cities 7758

New York World's Fair Exhibitor · Metals Bldg.

NEXT MONTH'S ISSUE

In the August Special Cement Issue of ROCK PRODUCTS there will be published for the first time in this country a reproduction of all the cement brands in their original color. Readers in all sections of the country have expressed a great deal of interest in this colored insert, and have ordered extra copies to be framed for mounting on the wall or to be placed under a glass desk cover for ready reference. The inserts will be folded and placed loosely in each copy of the August issue so that they may be removed without damage.

Dust Collection

Intense interest in dust collection applications has been aroused in the cement industry. The Special Cement number will describe some of the most recent installations for the removal of dust in crushing, screening, and pack house, and for the recovery of dust from kiln stacks. Photographs and diagrams will be used to illustrate the different types and methods of dust collection.

Science Applied to Control

Some of the leading authorities in the cement industry will discuss methods and equipment to control the quality of the finished product from quarry to the pack house. Cements of any of the existing types can be made at any plant but to do this in a profitable way is a different matter.

Special Cements

The manufacture of special cements such as, oil well cements, Puzzolana cements, introduce new problems. Articles pointing out the user's requirements and the manufacturers' opportunity in meeting this demand will appear in this issue.

Repair Parts

Buying of repair parts from companies other than the original manufacturer is often false economy. In the August issue some of the costly experience of companies seeking to save a small sum of money by purchasing parts in this way will be cited, and suggestions are offered as to purchasing and stocking parts which will produce economies.

Modernization Progress

Some outstanding examples of cement plant modernization will be described and illustrated. These examples will be representative of the trends in modernization which cement companies are expected to follow in the coming year.

Fuel Selection

With the Federal Coal Commission issuing lists of minimum prices for coal in the various regions, there is reason to believe that there will be a definite trend upward in the price of fuel which is such a substantial factor in the cost of manufacturing cement. The experience of the entire cement industry has been drawn upon to find the methods of selecting fuels and their testing, the sum total of which should be of practical value to production officials and chemists.

ROCK PRODUCTS

RECOGNIZED THE WORLD OVER AS THE LEADER IN ITS FIELD

With which has been consolidated the journals CEMENT AND ENGINEERING NEWS (founded 1896) and CONCRETE PRODUCTS (est. 1918)

VOL. 42, NO. 7

Contents for July, 1939

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ROCK PRODUCTS Bears the Twin Hall-Marks of Known Value.

Member Audit Bureau of Circulations ← Impartial measurement of reader interest in terms of paid circulation.

Authentic facts relating to editorial scope and readership analysis. → ABP

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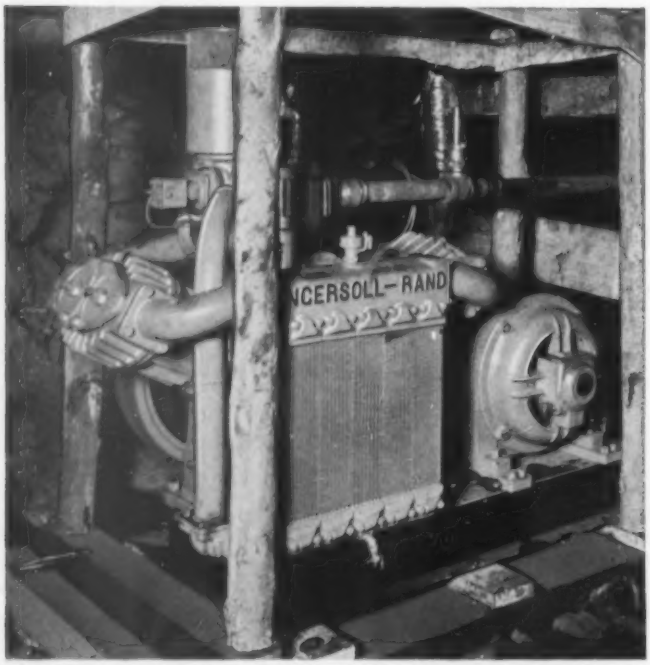
CLEANER VALVES AND PORTS



Belt-driven motor compressor in underground service. Operators of large and small compressors report that their selection of Texaco Lubricants is a major factor in getting improved performance.

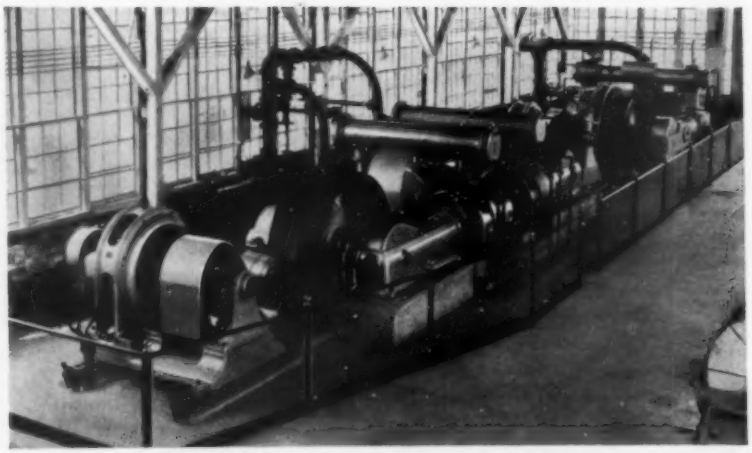
YOU CAN keep your compressor valves free from deposits by lubricating them with Texaco Alcaid, Algol, or Ursa Oils. When tarry, gummy deposits tend to slow valves down, the result is loss of efficiency.

Using Texaco Oils, valves stay clean, free from carbon and gummy deposits. With Texaco, valves open wide, seat snugly. Pressure is up where it should be.

You, too, can get this efficient service from your compressors. A Texaco engineer, trained in the use of Texaco Compressor Lubricants will gladly help you select the most suitable oil for them.

Phone the nearest of our 2229 warehouses, or write: The Texas Company, 135 East 42nd Street, New York City, N. Y.

Driller at work on the Mt. Rushmore Memorial. Compressors here are Texaco lubricated exclusively.



Three Ingersoll-Rand Two-Stage Compressors on large mining operation. Texaco is approved for use on these and all other types and makes of compressors.

TEXACO

TEXACO Alcaid, Algol, and Ursa Oils

PERFECTED LUBRICATION FOR AIR COMPRESSORS

No wonder they all like *Performance Proved*

SUPERINTENDENT
"Wire Rope Maintenance Costs Going Down? S-W-E-L-L! That means you're using Macwhyte PREformed..."

PURCHASING AGENT
"I buy on the basis of quality and service... That's why I buy Macwhyte PREformed."

MACWHYTE PREformed

FOREMAN
"We've speeded up our production schedule since we started using Macwhyte PREformed... fewer shutdowns for replacements now."

FEWER REPLACEMENTS...
BETTER OPERATION...
SAVINGS IN MAINTENANCE...
SPEEDED-UP PRODUCTION...
all are possible **when** you buy high quality wire rope*

(P. S. Have you Tried This Laboratory Tested, Field Proved, BETTER Wire Rope?)

WORKMAN
"Me? I like to work with Macwhyte PREformed. It's easy to handle and install... and it sure can take it!"

Macwhyte wire rope, famous for its long life and low cost, is better today than ever before!

LONG SERVICE

Macwhyte steels are better today... laboratory tests are more exact... workmen are more skilled and experienced... field tests are constantly proving and improving the right rope for the specific job.

Yes, you're assured of economical service from Macwhyte wire ropes.

AT LOWER COST

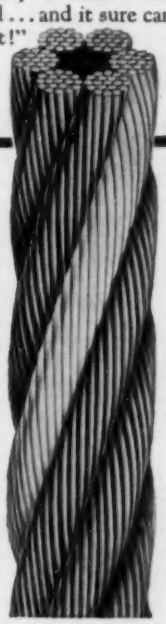
And you get it at lower cost, too. For example, the famous special Macwhyte internal lubrication protects Macwhyte ropes from corrosion, makes them easy to handle, cuts down internal friction... which naturally increases service life... lowers cost.

LESS WEAR ON MACHINERY

In addition, the special PREformed construction allows the rope to run smoothly, easily over sheaves and drums... with a minimum of wear on the machine and the rope.

Is it any wonder that there are more Macwhyte users today than ever before?

**There is no better wire rope than Macwhyte PREformed*



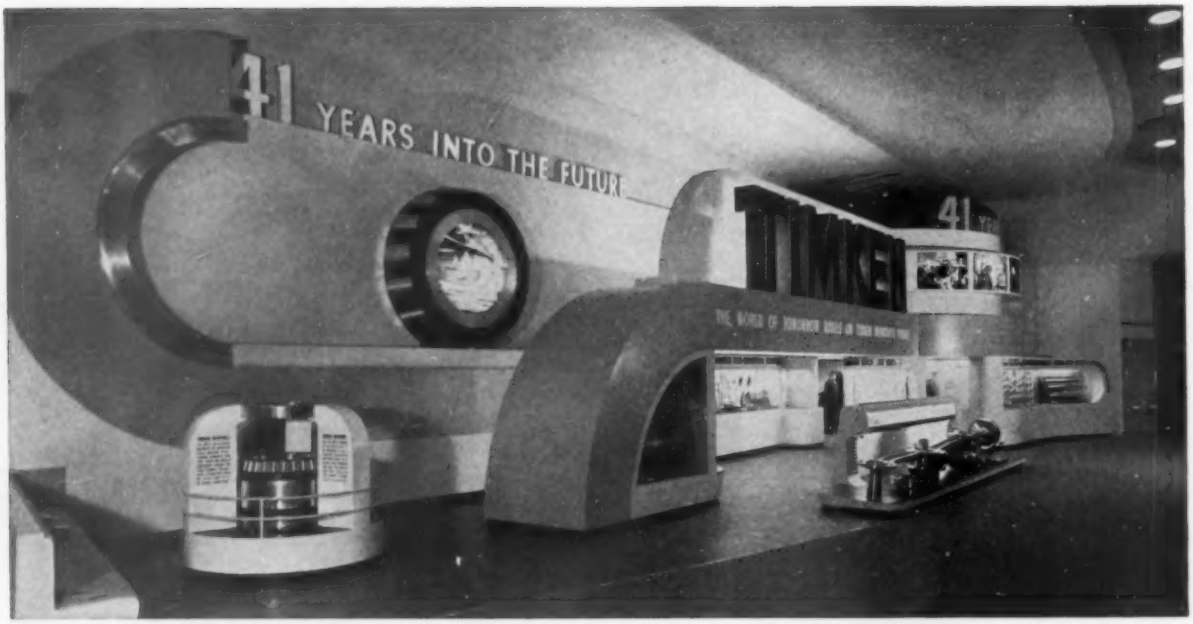
LOOK FOR THE *Whyte Strand*

MACWHYTE WHYTE STRAND IS BETTER BECAUSE IT'S MADE BY SPECIALISTS

NO. 413

MACWHYTE *Whyte Strand - PREformed* WIRE ROPE

MACWHYTE COMPANY KENOSHA, WISCONSIN New York, Pittsburgh, Chicago, Ft. Worth, Portland, Seattle, San Francisco. (Distributors throughout the U. S. A.)



WITH TIMKEN AT THE NEW YORK WORLD'S FAIR

INTERESTING HIGHLIGHTS OF THE TIMKEN EXHIBIT

One of the first automobiles to be equipped with TIMKEN Bearings.

A TIMKEN Roll Neck Bearing having a load capacity of nearly three million pounds.

A machine that measures the thickness of a human hair in hundred-thousandths of an inch, as a demonstration of the precision with which TIMKEN Bearings are made.

A diorama showing in miniature the world's largest electric steel furnace—capacity 75 tons of steel per heat.

A TIMKEN Fuel Injection Pump cut away to show the internal mechanism in operation.

The various parts of a TIMKEN Bearing automatically assembling and disassembling to demonstrate the tapered design and construction of the TIMKEN Bearing.

A display dramatizing the Timken Roller Bearing Company's contributions to modern locomotive design—including TIMKEN Locomotive Bearings, main rods, side rods and other reciprocating parts.

And

THE TIMKEN ROLLER SKATERS in a sensational novelty act performed on a platform only nine feet in diameter elevated seven feet above the floor. The skaters perform ten times daily.

The exhibit of TIMKEN Products at the New York World's Fair has been acclaimed one of the outstanding features of this, the greatest show of all time.

Strikingly original in conception, wonderfully beautiful in its gorgeous color scheme and brilliant lighting effects, the Timken Exhibit emphasizes the keynote of the Fair "The World of Tomorrow" in a manner that captivates every visitor. But the Timken Exhibit has other claims to pre-eminence apart from its originality and beauty. Never before for example, has such a comprehensive display of bearings been seen in one place. Here are shown TIMKEN Bearings ranging from a few ounces in weight to one weighing more than *three tons;* bearings for every possible application in industry and transportation—from automobiles to railroad trains and from precision machine tools to huge steel rolling mills.

Equally impressive are the displays of other TIMKEN Products; including TIMKEN Alloy Steels, TIMKEN Alloy and Carbon Steel Seamless Tubing, TIMKEN Rock Bits, and TIMKEN Fuel Injection Equipment for fuel oil burning engines.

Nor is novelty lacking, for as a demonstration of the precision with which TIMKEN Bearings are made there is a machine capable of measuring the thickness of a human hair in hundred-thousandths of an inch! Visitors can measure their own hair on this machine and keep the measurement records for souvenirs. Naturally this is one of the most popular spots in the entire Fair.

All in all the Timken Exhibit is a truly remarkable achievement—an attraction no visitor can afford to miss. You will find it in the Metals Building adjacent to the Trylon and Perisphere.

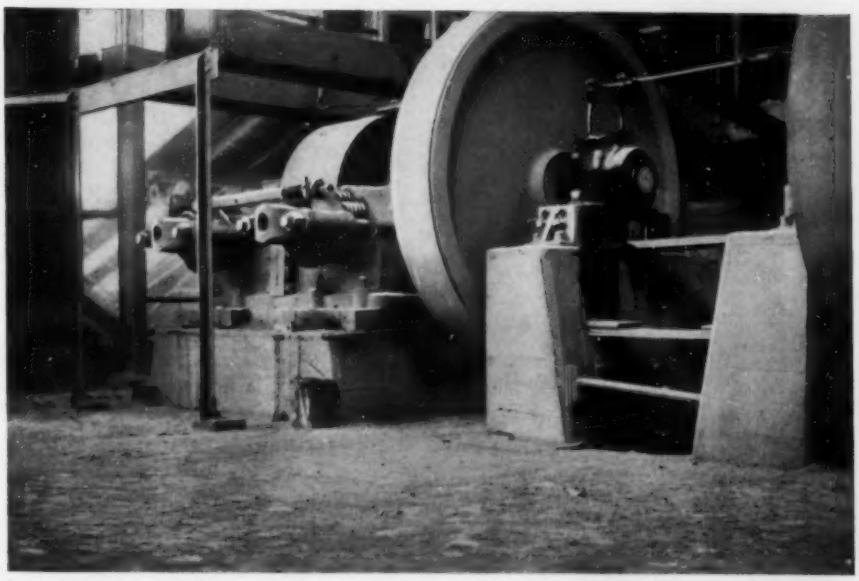
THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

Of Interest to Limestone Operators - - -

Good Agricultural Lime, readily saleable, can be made from waste fines, at low cost with



TRAYLOR CRUSHING ROLLS

Crushing rolls have long been recognized as producing fine ground material at the lowest cost per ton of any type of crushing machine, when the feed is such as can be handled by rolls, and for many years these machines have been used in a large number of different industries in such service.

Traylor Crushing Rolls have been built in several types and many sizes for more than thirty years, and are now in daily use in practically every civilized country in the world crushing most of the known varieties of ore and rock.

Traylor Rolls will crush to as fine as 20 mesh and are, therefore, particularly adapted to the use of limestone operators desiring to make agricultural limestone from their otherwise nearly worthless fines screened out of commercial crushed stone.

Installation of one of these machines is not particularly expensive and, therefore, it will pay you to investigate this source of potential extra profits. Write today asking for our Bulletin 3627 or to have our man around for a talk!

WE BUILD

Rotary Kilns
Rotary Coolers
Rotary Dryers
Rotary Slakers
Scrubbers
Evaporators
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
Grinding Mills
Ball Mills
Rod Mills
Tube Mills
Pug Mills
Wash Mills
Feeders
Rotary Screens
Elevators

Welded or Riveted Stacks, Tanks and Bins for any purpose.

TRAYLOR ENGINEERING & MANUFACTURING CO.

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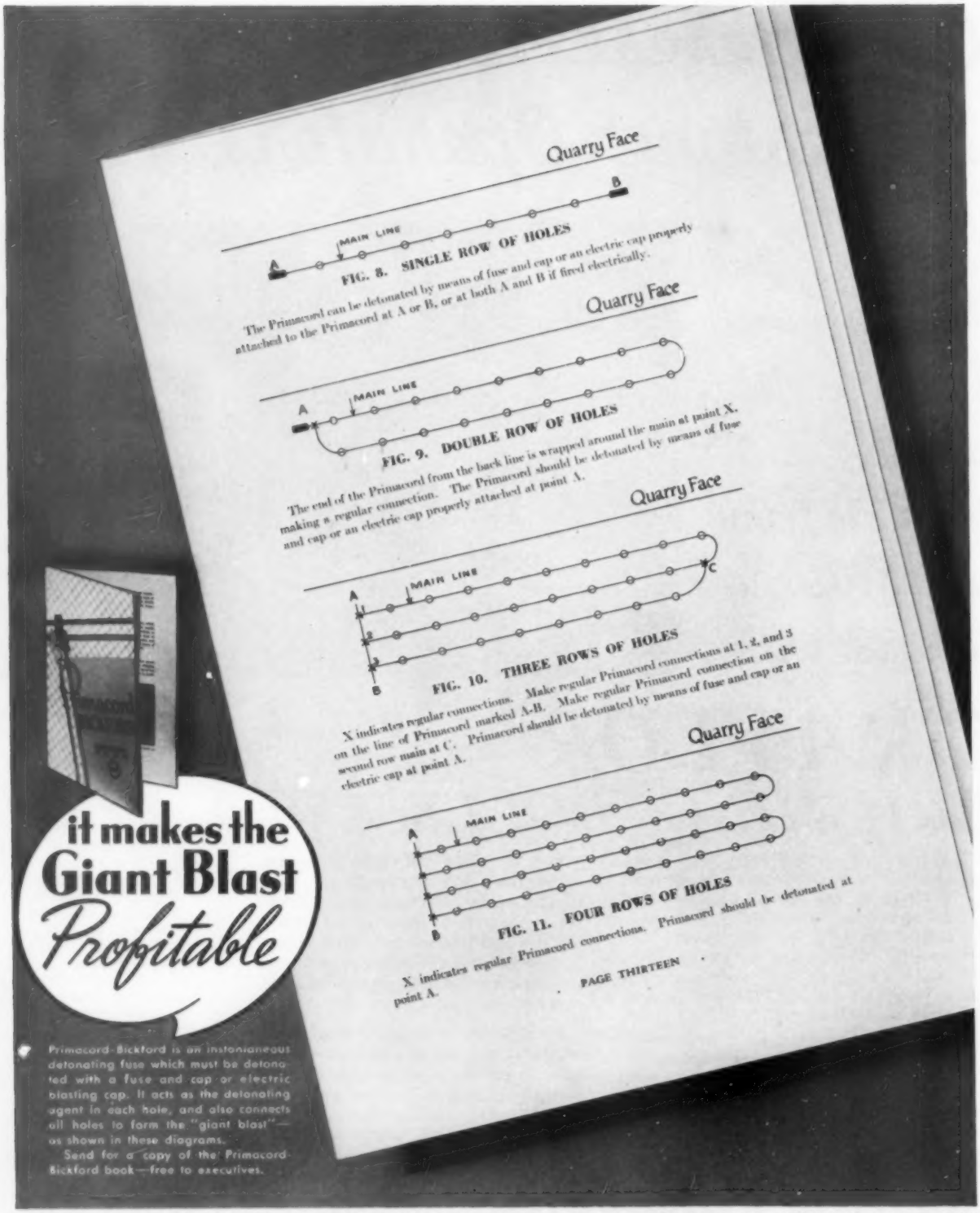
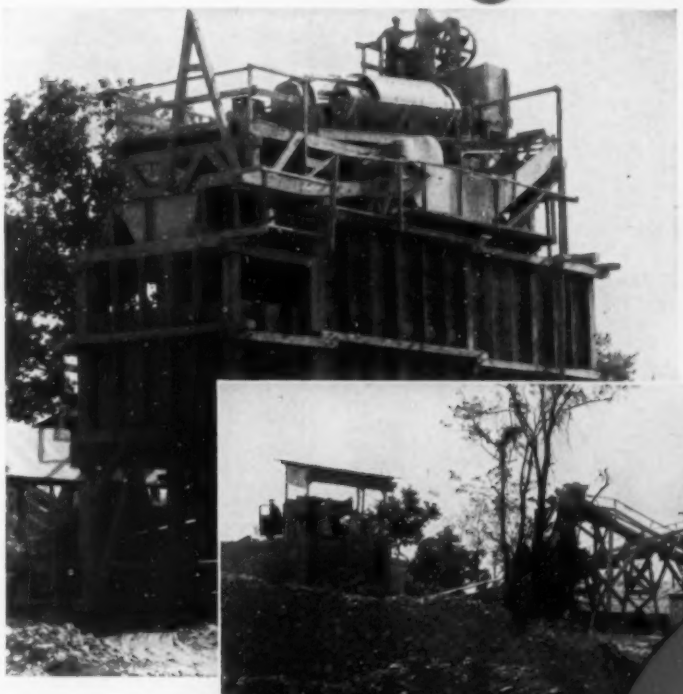


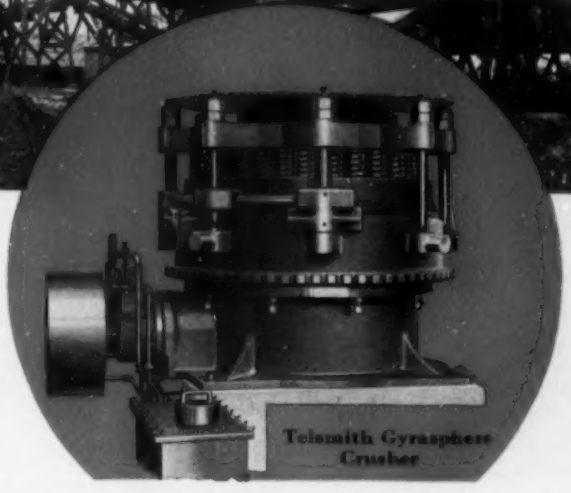
THE ENSIGN-BICKFORD CO., SIMSBURY, CONN., U. S. A. *Makers of Ensign-Bickford Safety Fuse since 1836*

PRIMACORD-BICKFORD *Detonating Fuse*

FB 10

Crushing Gravel at 3¢ PER TON





Yes, sir—*three cents per ton* to crush gravel. That's what the records of the Valley Sand & Gravel Co. show it costs to operate their No. 36 Telsmith Gyrasphere. This includes power, lubrication and maintenance, but not depreciation. Of this 3-cents-a-ton cost, only 1-3/10 cents goes for maintenance, which includes lubrication, repair parts and manganese liners installed.

"These costs are much lower than for any other crusher I have ever operated," says the plant superintendent, Mason Schoolfield.

Crushing very hard abrasive gravel from 4½" round to 1¼" square openings, output is 60-70 tons hourly, but "factors outside the crusher held production down," says Mr. Schoolfield.

Located at Port Republic, Va., this plant is owned and operated by N. A. Coulter and C. P. Brown. It was especially installed to produce 100,000 tons of sand and gravel for the construction of a huge rayon factory near Front Royal, Va.

In addition to the No. 36 Telsmith Gyrasphere Crusher, it is equipped with a 20" x 5' Telsmith Plate Feeder; two Telsmith Belt Conveyors, 24" x 77' and 20" x 54'; No. 6 Telsmith Belt Elevator, 42' long; 40" x 16' Telsmith-Ajax Washing Screen; 30" x 16' Telsmith Sand Drag; No. 7 Telsmith Sand Settling Tank; and five Telsmith Bin Gates.

Whether you are modernizing or want a complete new sand-gravel or quarry plant, *write for Bulletin E-11.*

GC-4-39

SMITH ENGINEERING WORKS, 508 EAST CAPITOL DRIVE, MILWAUKEE, WIS.

50 Church Street
New York City

211 W. Wacker Drive
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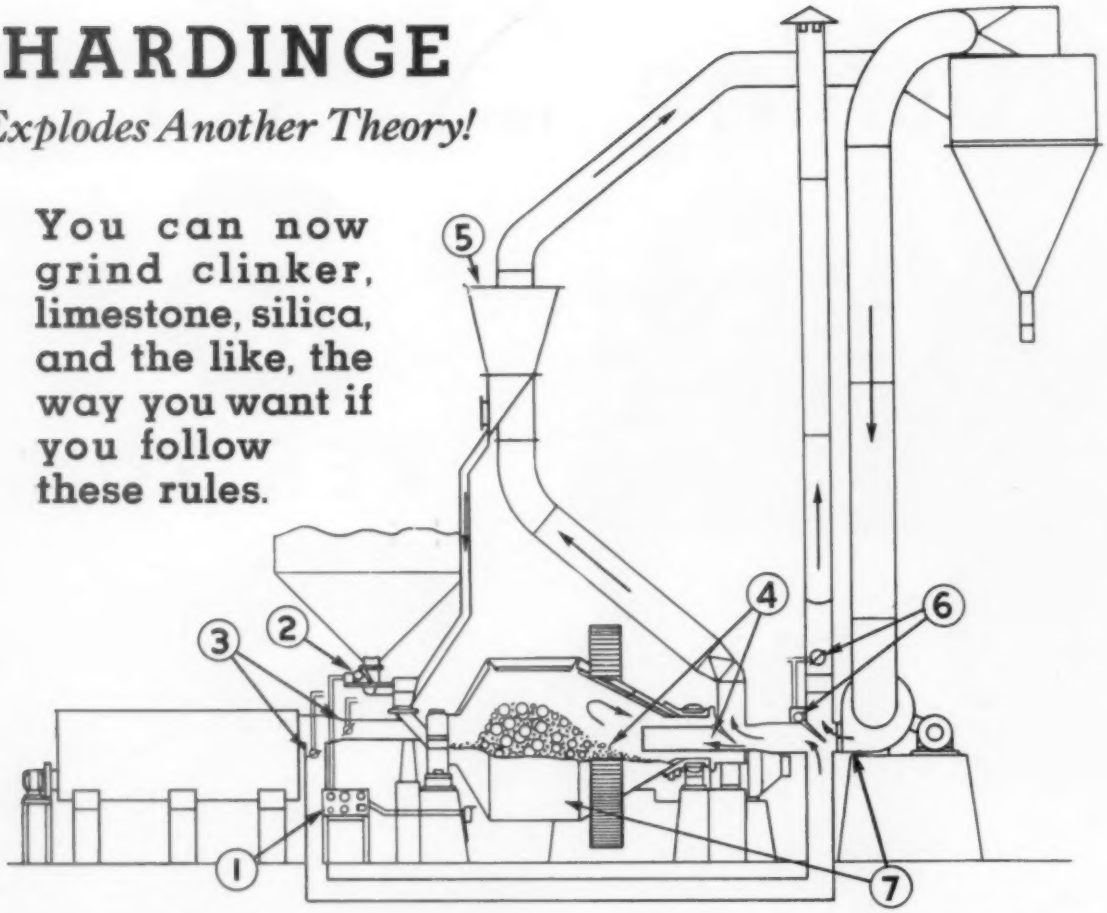
Brandeis M. & S. Co.
Louisville, Ky.

TELSMITH

HARDINGE

Explodes Another Theory!

You can now grind clinker, limestone, silica, and the like, the way you want if you follow these rules.



Rule 1—Control the feed rate by automatic means to compensate for continuous changes in feed size and hardness.

Rule 2—Use a feeder that records the weight fed and also signals the operator when the bin is empty or arches.

Rule 3—Remove excess moisture in the feed (if any present).

Rule 4—Control grinding action so as to secure the physical properties needed, particularly when sub-sieve (micron) sizes are desired.

Rule 5—Control the fineness within close limits, to meet specifications at all times.

Rule 6—Keep the temperature in the grinding system constant.

Rule 7—Use a grinding system that requires a minimum of power and maintenance.

Here's How Hardinge Obeys the Rules

1.—The "Electric Ear," using the sound of the mill as the indicator, controls the feed so as to compensate instantaneously for changes in feed size and hardness.

2.—The Constant Weight Feeder feeds by weight and signals the operator or starts a bin rapper the moment it fails to receive feed.

3.—The "Thermo-Mill" system drys as the mill grinds and through thermostatic control keeps temperature constant at all times within the system.

4.—By control of ball size as well as air in the mill independently of that required in the classifier, any character of product desired can be secured at will, even when an excess of micron sizes is wanted.

5.—The Hardinge Superfine Classifier with dual fineness regulating feature controls the fineness within close limits.

6.—When moisture is in the feed, it must be dried, or if the material being ground is sensitive to high temperature—heat of grinding—it must be controlled. Thermostatic control of the air in the system takes care of this important point.

7.—The Hardinge Mill holds the record for low maintenance, particularly on abrasive material. The conical shape creates ball classification and proportions the sizes to the work to be done, thus reducing power. The fan handles only clean air.

HARDINGE COMPANY *INCORPORATED*

YORK, PENNSYLVANIA, *Main Office and Works*

NEW YORK, 122 E. 42nd St. CHICAGO, 205 W. Wacker Drive SAN FRANCISCO, 501 Howard St. DENVER, 817 17th St.

10 YEARS—3,600,000 TONS

...AND IT'S NOT THROUGH YET!

THE Goodyear Style "B" conveyor belt pictured here was first installed on the main stone conveyor in the quarries of the Sturgeon Bay Company, Sturgeon Bay, Wisconsin, in April 1928 on specification by the G. T. M. — Goodyear Technical Man.

Operating in a wet tunnel, continuously exposed to damp and moisture, it was in service here almost ten years to the day—*handling 3,600,000 tons of crushed stone at a belt cost of only .00082¢ per ton!*

That would be a grand record for any belt under such conditions, but the Goodyear wasn't through yet. To be sure, it was frayed at the edges from idler wear, but it was still sound at the core. So in April 1938 it was cut down from 40" to 30" width and installed on the rock crusher return conveyor — *where it is still in service today, piling up its tonnage total!*

YOU CAN DO IT BETTER WITH GOODYEAR RUBBER

Consult the G. T. M.

Let the G. T. M. tell you about the special features of Goodyear conveyor belts that insure such exceptional service—their tire-tread-tough, abrasion-resisting covers—their secret mildew-inhibiting friction that resists damp-rot attack. Let him show you how they are correctly specified to match the frequency and severity of both flexing and abrasion on your particular job.

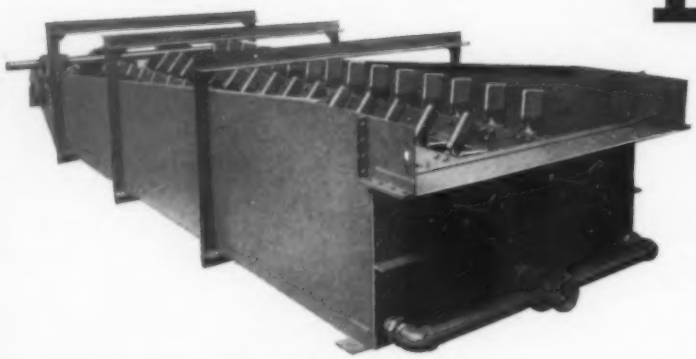
To bring the G.T.M. to your office, just write Goodyear, Akron, Ohio, or Los Angeles, California — or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

Centennial of Charles Goodyear's discovery of vulcanization

THE GREATEST NAME IN RUBBER

GOODYEAR

To PLANT OPERATORS who demand the BEST

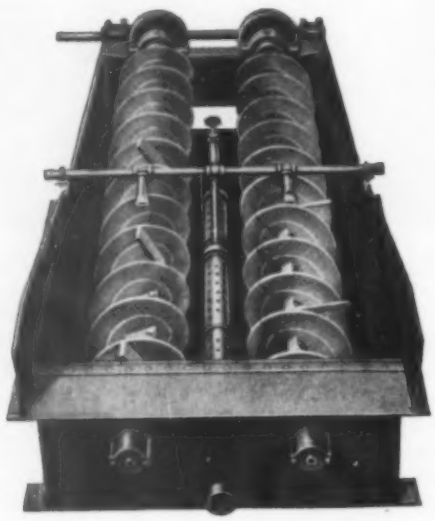


EAGLE PADDLE LOG WASHERS

through the greater action of the paddles, are extremely effective for breaking down and removing those difficult, tough clays and cemented aggregates found in some gravels. These paddle type machines subject the aggregates to the same washing action which proved so successful in our screw type. They are noted for their ruggedness, dependability, efficiency and ability to handle large production at lowest cost.

"SWINTEK" SCREEN NOZZLE LADDER

You can double your pump capacity with the use of these chain type cutters. They eliminate all stoppages and insure an even flow of material—no pumping delays.



EAGLE SPIRAL SCREW WASHERS

ARE SPECIFICALLY DESIGNED to thoroughly scrub the aggregate—removing all mud, sticks, leaves, silt, coal, shale and mud balls, and deliver a finished product of the finest quality.

Twin screws throw the aggregate to the center of the machine and convey it the length of the tub over the inlets where water rushes up through the material, cleaning it thoroughly and conveying all foreign matter to the surface and over the lower end of the overflow where it is flumed away.

All EAGLE WASHERS are built of the highest quality material and are designed for extremely high efficiency, low operating cost, large capacity and long life. With an EAGLE WASHER you can turn deposits which were formerly considered unprofitable into real money-makers.

EAGLE IRON WORKS

DES MOINES, IOWA

FOR SMOOTH SAILING IN ROUGH SERVICE!

A wire rope developed to provide the ultimate in safe, saving service. The finest product of Roebling's unexcelled steel-making, research and rope-fabricating facilities!

JOHN A. ROEBLING'S SONS COMPANY, TRENTON, N. J.
BRANCHES IN PRINCIPAL CITIES

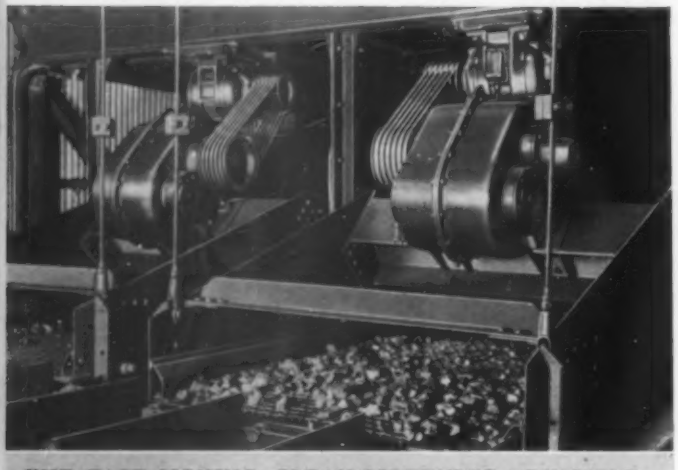
STRONGER—Wire of highest strength consistent with ductility and toughness

TOUGHER—Provides maximum resistance against wear, sudden shocks, vibration

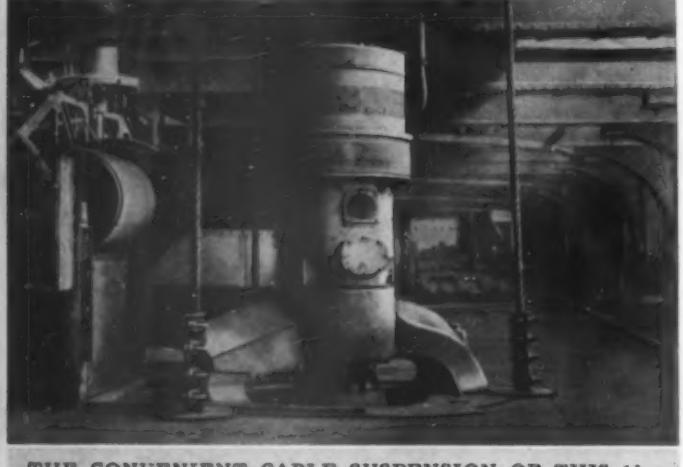
SAFER—Unequalled for uniformity of quality

SAVING—Insures lowest general average operating cost

HOW PROGRESSIVE MAKE EACH MACHINE FLOW SHEET PAY ITS



THE FAST MOVING, CLEAN-SCREENING PRINCIPLE behind Allis-Chalmers Low-Head Vibrating Screens is acknowledged throughout the industry. This unit turns out a better product at lower cost for a midwest crushing plant.



THE CONVENIENT CABLE SUSPENSION OF THIS 14 in. Newhouse Crusher reduces installation costs . . . dampens out crushing vibrations for this plant.

Low-Head Screen Offers New Savings In Head Room . . . In Operating and Maintenance Costs . . . In Improved Product!

Ask any experienced operator the name of the fastest selling screen on the market today. Nine chances out of ten he'll say, "Allis-Chalmers Low-Head!"

And all you have to do is try one in your plant . . . then you'll find out why! For this rugged horizontal vibrating screen gives you new economies . . . new savings in head room that eliminate expensive changes in plant layout . . . new maintenance-free performance that cuts your operating costs . . . new screening efficiencies that give you a better product!

Find out how you can put these new savings to work in your plant. Bulletin 1478-B gives all the facts about Allis-Chalmers Low-Head Vibrating Screens. Write for your copy today!

CRUSHING CEMENT AND MINING DIVISION

ALLIS-CHALMERS

MILWAUKEE, WISCONSIN

OPERATORS ON THE OWN WAY!

Large Capacities...High Reduction...Uniform Product—All Extra Values You Get at No Extra Cost With Newhouse Gyratory Crushers!

Meeting today's demand for low-cost, high-speed crushing . . . turning out a uniform cubical product under all types of operating conditions, the Allis-Chalmers Newhouse Gyratory Crusher brings real savings in plants all over the country.

The unusual crushing action combined with non-choking concaves and unobstructed feed openings permit operation under choke feed . . . give you modern high-speed . . . high-capacity operation.

Fewer moving parts plus protective oiling system cut maintenance and service costs . . . reduce outage time.

Let a trained crushing engineer in the district office near you help you with your flow sheet problems; or write for Bulletin 1469-E for complete details on the modern Allis-Chalmers Newhouse Crusher.

A-1131

Over 90 Years of Engineering Superiority Work for You When You Specify Allis-Chalmers!

NEWS of how the Industry CUTS COSTS!

Discovers New Method for Increasing Production . . . Decreasing Operating Costs

A new method of increasing production . . . cutting power and maintenance costs was recently reported by John F. Koenig, president, Koenig Coal & Supply Co., Detroit.

Large boulders in the gravel bed necessitated stationing four or five men at the crushers to prevent bridging, according to Mr. Koenig.

The Koenig engineers, working in conjunction with Allis-Chalmers engineers, cleared this trouble up—nearly doubled production. This was accomplished by the introduction of non-choking concaves, increase in crusher throw and speed, together with anti-friction countershaft bearings.

Cost of gravel dropped from 12 cents to six cents per ton—a saving of $17,500 for the year 1938. Only new equipment needed, in addition to crusher parts, was one Allis-Chalmers Low-Head Vibrating Screen to reduce carry-over to the crushers.

Automatic Mixing Plant Gets First Test at Grand Coulee Dam

A completely automatic concrete mixing plant received its first test at the world's largest dam—Grand Coulee on the Columbia River.

Because the aggregate taken from the face of a mountain varies in quality from hour to hour and from day to day, the classifiers operate at variable speed. For that job Allis-Chalmers Vari-Pitch Speed Changers were selected.

According to the Grand Coulee engineers, the eight Allis-Chalmers Vari-Pitch Speed Changers haven't been shut down once for servicing since their installation over a year ago.

Interesting Method of Handling Crusher Feed Saves Pennsylvania Crushing Plant Cost of Conveyor Belt Replacement

An interesting method of handling crusher feed was recently reported by a Pennsylvania crushing plant. By using an Allis-Chalmers Utah Electro-Magnetic Vibrating Feeder to convey rock from the primary breaker, flow sheet difficulties have been ironed out.

Formerly rock landed on a deflecting spout which was supposed to lower it to the conveying belt gently. However, the plant engineers stated, there was a lot of trouble caused by jamming-up at the spout.

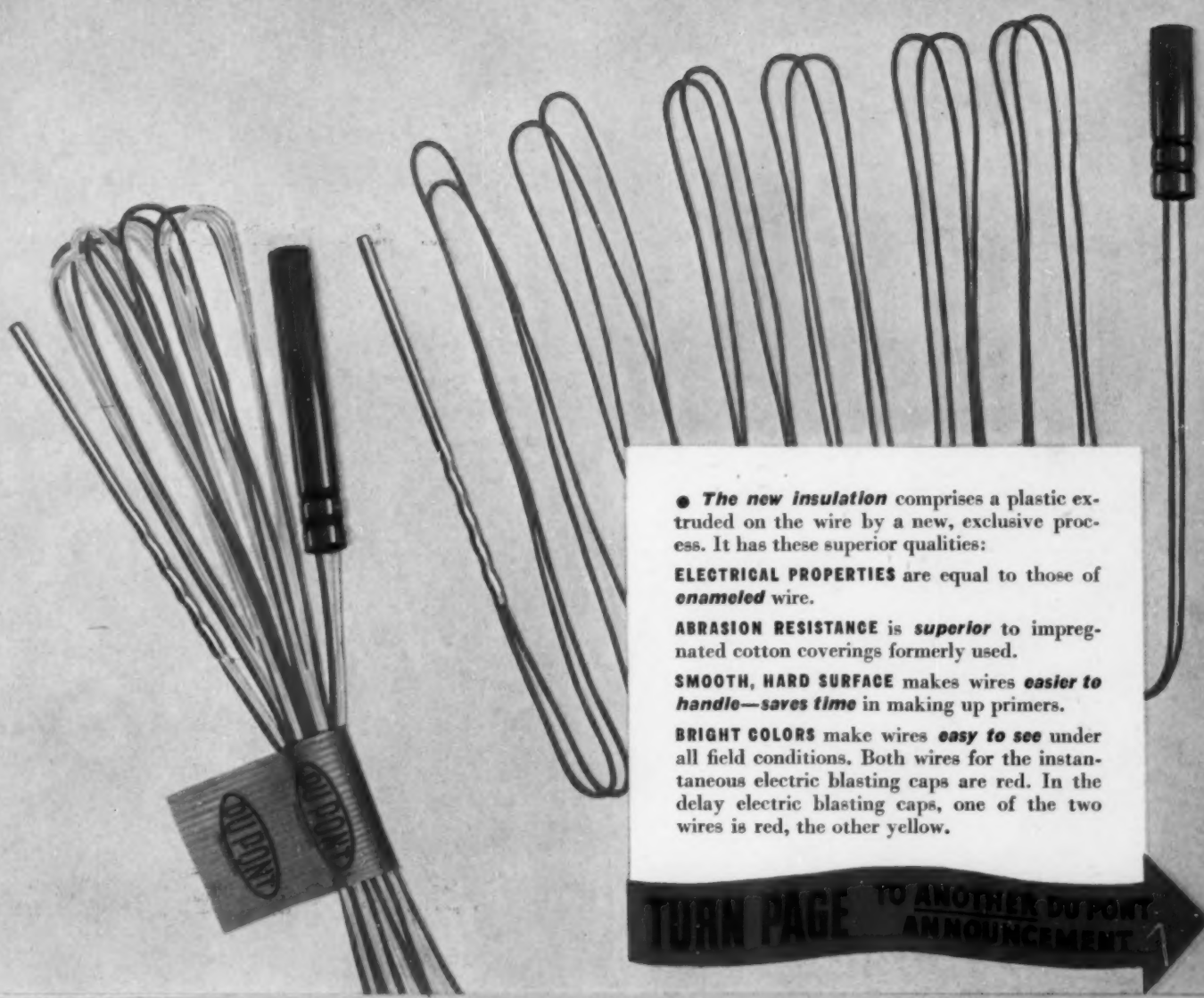
Occasionally long, jagged pieces became wedged so that a sharp corner pierced the belt, and on one occasion, almost the entire length of the belt was slit before the conveyor could be stopped.

Latest reports show that this trouble has been eliminated by installing the Utah Feeder. The unit handles heavy, abrasive granite from fines up to sizes four feet long at 250 tons per hour.

Du Pont Announces

A NEW *plastic* INSULATION

FOR DELAYS AND ELECTRIC BLASTING CAPS



● ***The new insulation*** comprises a plastic extruded on the wire by a new, exclusive process. It has these superior qualities:

ELECTRICAL PROPERTIES are equal to those of ***enameled*** wire.

ABRASION RESISTANCE is ***superior*** to impregnated cotton coverings formerly used.

SMOOTH, HARD SURFACE makes wires ***easier to handle—saves time*** in making up primers.

BRIGHT COLORS make wires ***easy to see*** under all field conditions. Both wires for the instantaneous electric blasting caps are red. In the delay electric blasting caps, one of the two wires is red, the other yellow.

TURN PAGE TO ANOTHER DU PONT ANNOUNCEMENT

DUPONT
REG. U.S. PAT. OFF.

EXPLOSIVES

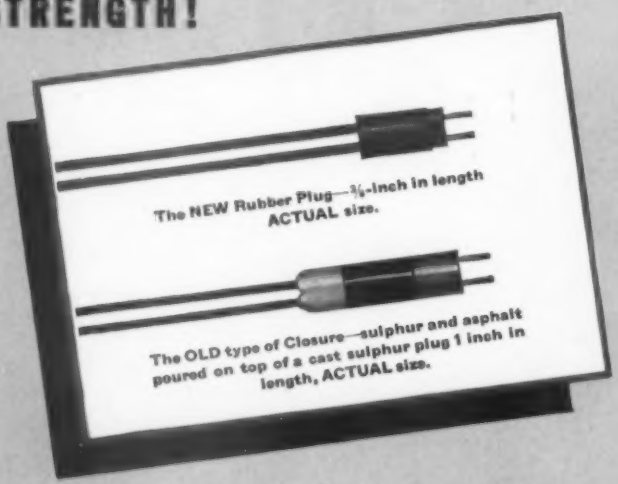
and BLASTING ACCESSORIES

Du Pont Pioneers Again

A NEW RUBBER PLUG CLOSURE

Rubber plug is shorter - priming made easier and safer - more water resistance

SAME EXPLOSIVE CHARGE AND STRENGTH!



THE NEW CLOSURE consists of a rubber plug, compounded especially for this purpose, crimped tightly into the shell. It offers these advantages:

WATER RESISTANCE IS INCREASED beyond former standards for ***waterproof*** electric blasting caps. Regardless of temperature, this water resistance is the same.

SHORTER SHELLS make priming ***easier and safer.*** Instantaneous caps are ½" shorter, and each delay 1⅛" shorter than formerly. ***But they contain the same explosive charges and strength.***

LEG WIRES ARE GRIPPED so tightly that they cannot be pulled out of the shells.

This New Insulation and This New Rubber Plug Closure Assure Even Greater Dependability . . . At No Extra Cost.

These improvements are now available on all delay electric blasting caps and will be made available on increasing quantities of instantaneous caps as soon as manufacturing facilities can be installed. E. I. du Pont de Nemours & Co., Inc., Explosives Dept., Wilmington, Del.

DON'T RUN THE RISK OF Mmisfires . . . REMEMBER— THE MOST DEPENDABLE DETONATOR IS THE SAFEST DETONATOR

DU PONT

EXPLOSIVES

and BLASTING ACCESSORIES

WHAT'S THE DIAMETER OF THAT SHEAVE?

FROM THE DAILY REPORT OF A
TIGER BRAND WIRE ROPE ENGINEER

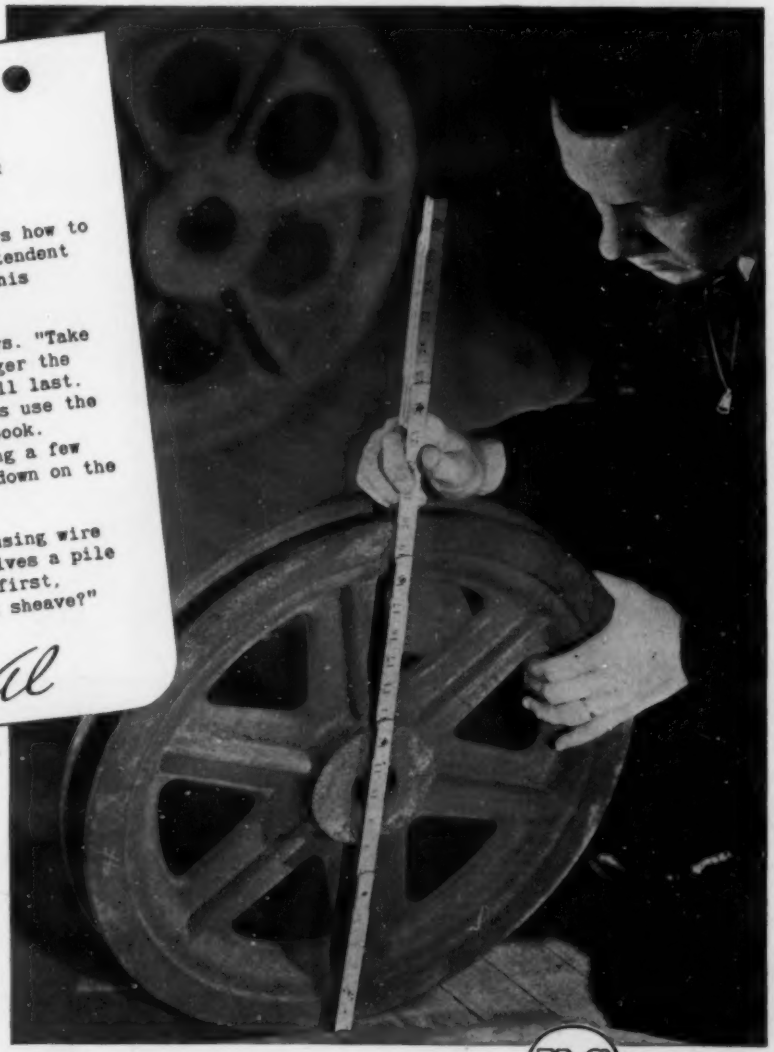
If there ever was a man who knows how to use wire rope, it's the superintendent here. This AM I asked him what his secret is.

"Just good horse sense," he says. "Take sheaves, for instance. The larger the sheave, the longer the rope will last. Anybody knows that. So I always use the size recommended in your handbook. What's the percentage of saving a few cents on a sheave if it cuts down on the life of the rope?"

He's right. A lot of people using wire rope today would save themselves a pile of grief if they'd just ask first, "What's the diameter of that sheave?"

Yours,

Al



TO get the most satisfactory rope life on your equipment, use large sheaves. Undersize sheaves cause high bending stresses which in turn cause wire failures of the square off type (fatigue breaks) to occur.

Another result of small sheaves is accelerated wear. Pressure of a rope on a sheave is inversely proportional to the sheave size. If the sheave is too small, this excessive pressure will cause both rope and sheave groove to wear out rapidly. Small sheaves also reduce rope strength, because the individual strands and wires cannot adjust themselves properly to an unduly sharp bend.

That's why it's vitally important to use sheaves that are of adequate diameter. In general, follow this table. In case of question, our engineers will be glad to consult with you.

WIRE ROPE	SHEAVE FACTOR Recommended*	Minimum*
6 x 7	72	42
18 x 7	51	34
6 x 19	45	30
6 x 21	45	30
6 x 25	45	30
6 x 30	45	30
8 x 19	31	21
6 x 37	27	18
5 x 19	27	18

*times rope diameter

USS

EXCELLAY *Preformed* WIRE ROPE

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York

COLUMBIA STEEL COMPANY
San Francisco

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

August

THE CEMENT ISSUE

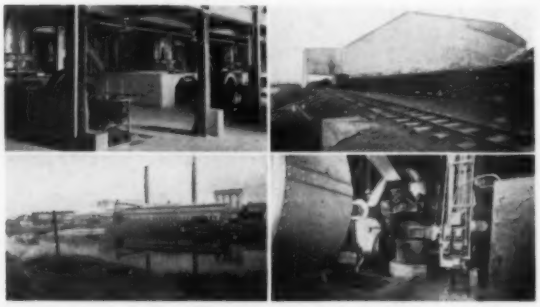
DUST - once a nuisance now profit !!

You've seen how easy it is for magicians to pick dollars out of the air. It's easy enough too, to design and build new plants without a dust problem, but changing an old plant where the equipment and operations have been dusty is another story. Read how one of these old plants licked this problem.

Here's the answer to your dust problem.

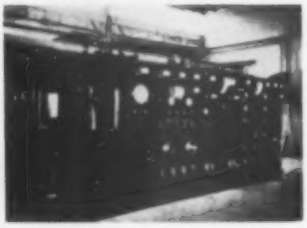
Does it Pay to Modernize?

These cement plants find it does!



Complete rebuilding in some cases; new layouts and new equipment in others. The result —improved products or increased efficiency which will soon pay for the modernization costs. Not a rehash of material previously published but all new information especially written for the operating executives.

SCIENTIFIC CONTROL FOR THE CEMENT INDUSTRY



Read how scientific control is being applied in the quarry, mill and laboratory. Every step in the manufacture of cement from the quarry to pack house is now subject to some form of instrument control, eliminating the variable "human element." Electric "eyes" and "ears" automatic feeders, pyrometers, kiln's speed control, draft control are a few of these modern developments which take the "guess work" out of cement manufacture.

"I CAN FIX IT FOR LESS" he thinks

So says the local foundry when asked to repair a broken or worn out part. Up to now many unwary plant operators have fallen for this first cost argument and have not given adequate consideration to the long experience and painstaking engineering of the equipment manufacturers. Here are first hand accounts of some costly lessons they learned.

How do YOU buy your Fuel?

No longer do cement companies say "Ship so many cars of coal"—Read this important article on their methods of selecting, testing and buying fuels.

ALL THIS TOO!

Washing and Classifying Sand; Crushing, Sizing, Testing and Specifying Aggregates; Concrete Products; outstanding plant descriptions of interest to other branches of the rock products as well as all the regular departments.

WHAT'S NEW!!

This special division prepared with the cooperation of equipment manufacturers will show you all the latest developments and recent improvements made in

NEW MACHINERY AND EQUIPMENT

Here's PROFIT for Advertisers

100% COVERAGE

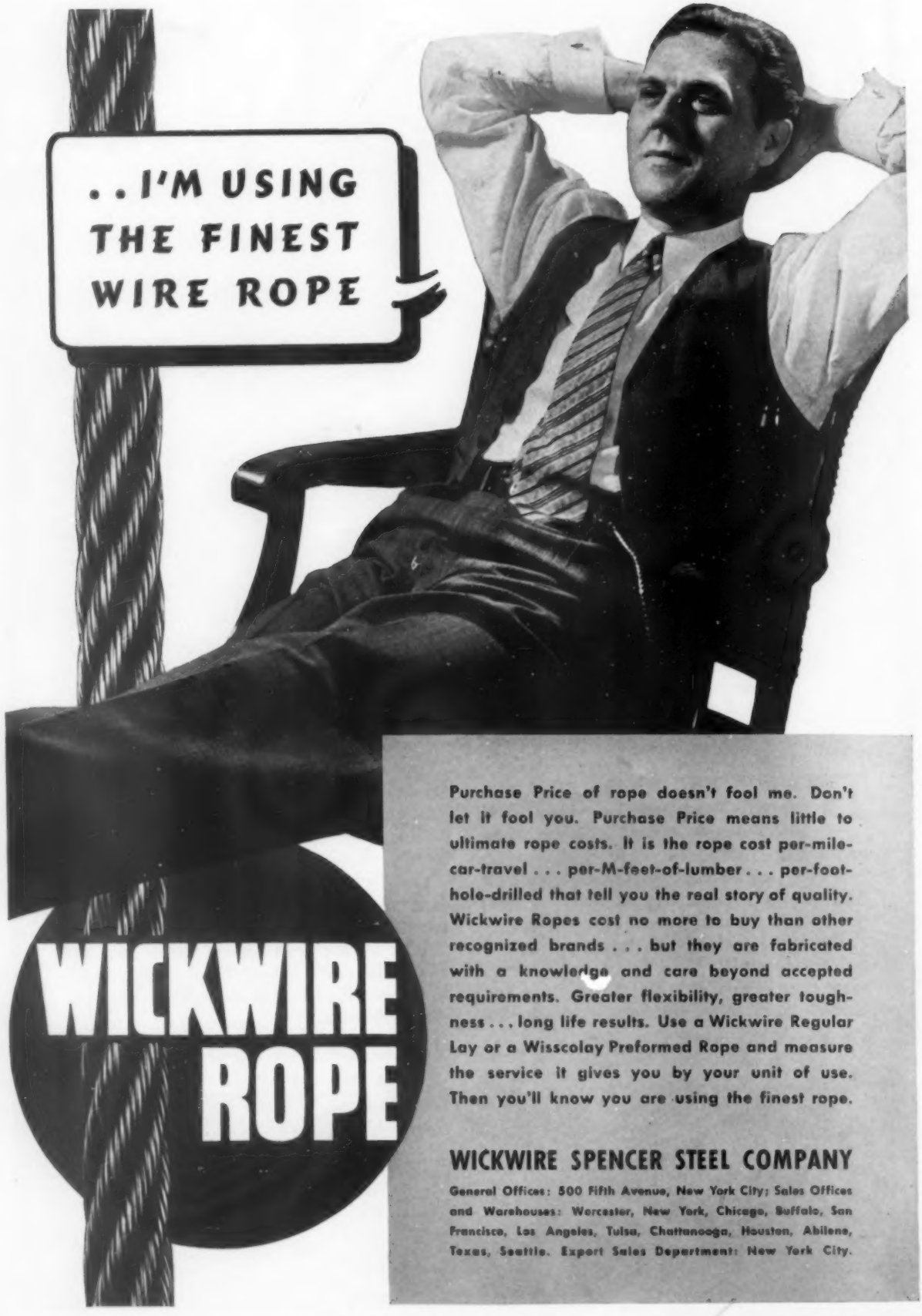
Every executive gets a copy

MAXIMUM READER INTEREST

Articles designed to interest every branch of the industry insure the absolute maximum of reader interest. Advertisers' messages reach the full buying power of the entire field. Be sure your story is fully told. Regular rates prevail. Forms close July 20.

The Greatest Cement Issue of All

ROCK PRODUCTS for *August*



Purchase Price of rope doesn't fool me. Don't let it fool you. Purchase Price means little to ultimate rope costs. It is the rope cost per-mile-car-travel . . . per-M-feet-of-lumber . . . per-foot-hole-drilled that tell you the real story of quality. Wickwire Ropes cost no more to buy than other recognized brands . . . but they are fabricated with a knowledge and care beyond accepted requirements. Greater flexibility, greater toughness . . . long life results. Use a Wickwire Regular Lay or a Wisscolay Preformed Rope and measure the service it gives you by your unit of use. Then you'll know you are using the finest rope.

WICKWIRE SPENCER STEEL COMPANY

General Offices: 500 Fifth Avenue, New York City; Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City.

Rock Products
THE INDUSTRY'S RECOGNIZED AUTHORITY
JULY, 1939

GOD SAVE FREE ENTERPRISE!

ALONG with other commentators on present tendencies we refer occasionally to the "American System." Now is a good time to do a little straight thinking on the fundamentals of this American System as opposed to planned economy by a totalitarian government, toward which along with other nations we appear to be drifting. The keystone of the American System is *free enterprise*.

If we have the necessary capital, or are able to obtain it from others who have faith in our character and enterprise, there is no law, natural or political, to prevent us from building, let us say an aggregates plant, anywhere in these United States.

It may be that the locality we pick already has a great surplus of productive capacity, and most assuredly the existing producers will not welcome another plant. They will use every means available to keep us out. That is as it should be. Our project should be tested in every way, whether we think the means employed are fair or foul.

Maybe it turns out that the process we thought so revolutionary and cost saving isn't any better than that of our competitors. Maybe we find it takes more than a good idea to make the business successful. Maybe it takes more capital than we anticipated and we can't command the additional capital. Then our business judgment has been at fault and we have incurred a loss for ourselves and our associates. That would be unfortunate for us but it would be a mere incident in progress under the American System.

Crude and wasteful as such an incident is described by advocates of planned economy it is far better for the health of industry and society than to require us to obtain from a political government a certificate of necessity or some other permit to enter a business of our own choosing. We now know from experience that the sum total of all such individual failures is far less costly than government directed business. Moreover, it contains the germ of all progress.

Suppose, however, we succeed in establishing our new business and we find ourselves thrown into competition with a group of producers who have far too much capacity. After attempts to break into production with cut prices and attempts of our competitors to freeze us out, we all (including our competitors) come to the conclusion that nothing is gained by giving the material away. Some one of the competitors decides that if he can't get a dollar a cubic yard for his aggregate he won't sell any, and he says so, and his word is believed. If we have any brains or business judgment we decide if Blank can get a dollar a yard for his stuff we can get a dollar for ours. And others do likewise.

Such outcome does not require collusion or a gentleman's agreement or other illegal act. Temporarily at least there will be a stabilized price—a uniform price, which so agitates some reputed economists. But there is no monopoly nor the slightest chance of one. It won't be long before some large purchaser appears on the scene, and by offering to place all his business with one producer, gets a lower price. In the long run this producer is undoubtedly acting unwisely for himself. His temporary increase in volume permits him to lower his costs and make a greater profit, but he has lowered the price of all material and when his volume is gone he will find competition on the lower price level much harder. However, he has provided the necessary stimulus to get everybody's costs down.

On the other hand, if the scheme of follow the leader works too well and prices stay at a profitable level long enough, newcomers are sure to be attracted to the industry, who will start the process all over again. Only rare good judgment on the part of all the producers can keep the industry on an even keel for any length of time—good judgment so rare that we know of no examples of it in the past.

Knowing how our basic American industries operate we have no fear of monopolies. They are possible in patented commodities, or in industries which have rare raw materials; but even here the managers are constrained by fear of substitutes.

As long as enterprise is free and Americans are individualists any attempt at monopoly, local or national, invariably carries the seed of its own destruction. No law, state or national, can ever be made an effective substitute for it. Any law must be administered by a few, and however mighty the intellects of those few, they can never acquire a minute part of the knowledge and experience that actuates the millions of intellects that now direct American business enterprise—not perfectly, but with constantly better understanding of individual social responsibility.

Nathan C. Rockwood

Sand Drag Does Double Duty

All-steel plant replacing timber structure, comprises four distinct units located independently of each other and in sequence

BY BROR NORDBERG

MASONS' SAND and plaster sand are the principal products of the Brilliant Sand Co., Steubenville, Ohio. The company was formed in 1925 to take over the property of the Castner Sand and Gravel Co., at Brilliant, Ohio, which still earlier had been operated by the Steubenville Sand and Gravel Co.

In 1938 the old timber skip-hoist-operated plant was torn down and replaced by one of all-steel construction. It has a greater capacity than the former one and is of rather unique design.

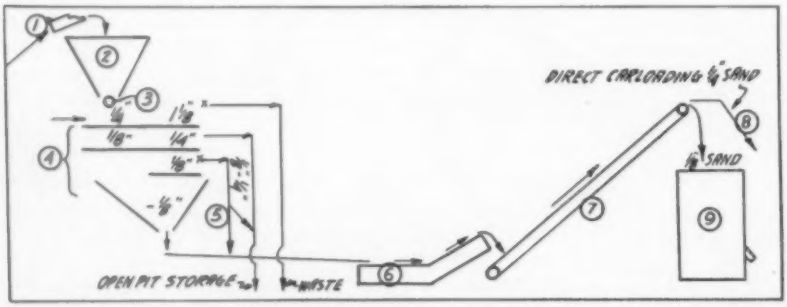
Bin storage is provided only for the masons and plaster sands; concrete sand which is secondary in importance is loaded out as produced and the small percentage of gravel is stored in two open pits.

The deposit is unique in that 60 to 65 percent of the total is minus 8-mesh. The sand is sharp and of unusual quality and occurs to a depth of over 100 ft. Excavation is by a 1-cu. yd. Sauerman slackline cableway with the bucket emptying into a 20-ton steel hopper over a screen which separates the gravel from the sand.

Present workings are about 650 ft. from the plant, which is located on the bank above. A 60-ft. American Hoist and Derrick Co. steel mast has been erected adjacent to the hopper to give the needed bucket lift. The bucket cable-way system is powered by an American Hoist and Derrick two-speed hoist which is driven by a 75-hp. motor through silent chain drive, designed to complete a round trip in less than two minutes.

Four distinct units comprise the plant: the hopper and screen, the sand washing equipment, the masons sand storage silo and a gravel rewashing plant, all of which are located independently of each other and in sequence on the ground plan. The hopper discharges on to a 3- x 12-ft. horizontal vibrating screen through a roll-type feeder, where it is washed. The screen has 2½ decks and separates out two sizes of gravel.

Oversize gravel (plus 1⅛-in.), which is a very small percentage of



Flow sheet of plant—(1) cu. yd. Sauerman bucket; (2) 20-ton Columbus hopper; (3) Electrically driven, Columbus rotary feeder; (4) 3- x 12-ft. Symons 2½-deck horizontal screen; (5) ⅜ to ¼-in. material goes into larger gravel storage when producing masons' sand. When making concrete sand, this product goes with minus ⅜-in. sand into the sand drag; (6) No. 5 Columbus sand washer; (7) 55-ft. Columbus belt-bucket elevator; (8) concrete sand directly for loading; (9) masons' sand goes into 200-ton Marietta concrete stave silo

Simple but efficient sand and gravel plant layout. Slackline bucket is emptying into hopper over a horizontal screen. In the foreground gravel is stored in pits for reclaiming by crane and rewashing in the plant on the right. In the background may be seen the sand drag and to the extreme right is the concrete silo for mortar sand storage

the entire output, is run through a spout to waste, and sized gravel is spouted into storage. Pits have been excavated to a depth of 12 ft. to provide for storage of several hundred tons of each size of gravel. Screen cloths used are ¼ in. followed by 1⅛-in. square openings on the top deck, ⅛-in. and ¼-in. on second deck and ⅛-in. on half-deck.

Sand Drag Produces Two Kinds of Sand

Masons sand and concrete sand are produced as independent operations through a single blade-type sand washer. In producing masons sand, only minus ⅛-in. sand and water is laundered into a single-blade sand drag, and the ⅛- to ¼-in. product is spouted into gravel storage. In making concrete sand, all minus ¼-in. sand enters the same sand drag. The sand drag is located on the ground where it is easily accessible for repair and adjustment.

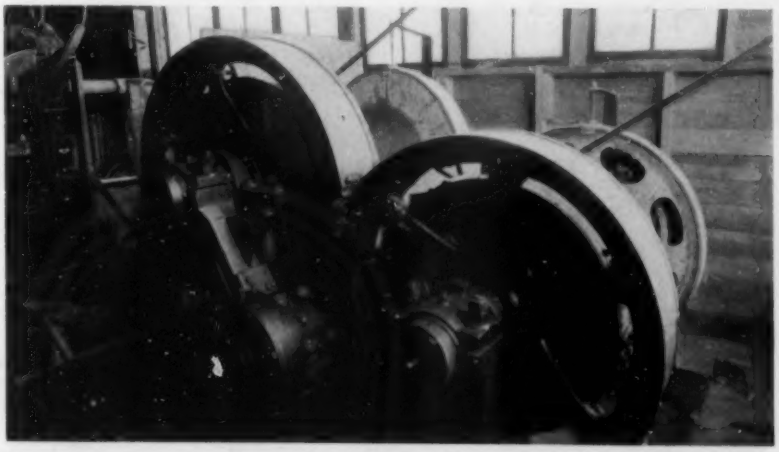
Water is sprayed from perforated pipe directly on the drag blades to dislodge sand and to add clear water into the washer. Either sand product goes from the sloping drain board directly into an inclined belt bucket elevator, 55-ft. centers. Concrete sand is loaded for shipment as it comes from the discharge of the elevator and is only produced when there is an order for it.

Masons sand is stored in a 16- x 30-ft. concrete stave silo of 200-ton capacity, which is plastered on the inside to prevent leakage. The silo is constructed so that excess water drains off freely from the bottom. A standard car of masons sand is loaded out from the silo in 10 minutes through a bin gate.

Gravel is reclaimed from the pit stockpiles to a re-washing plant by a Koehring gasoline-driven crane with a ½-cu. yd. bucket when shipments are made either by truck or rail. The re-washer consists of a 20-ton steel bin, hopper-bottomed, with one side pitched at a 45 deg. angle. This bin is kept full of gravel and has a chute near the top for direct loading into railroad cars. In the chute is a gravity screen on which water is played under pressure when the car is being loaded. Located lower down on the bin is a second chute, used in truck loading, with wash water added through a 4-in. line into the top of the bin. About 600 g.p.m. is added through a flexible line—the entire water output of a 4-in. Deming pump driven by a 25-hp. motor. The same pump supplies wash water for the plant, which generally is not in operation when gravel is being loaded out.

W. J. Hukill, secretary-treasurer and general manager of Brilliant Sand Co., caught by the camera. To the left, sand drag and elevator leading to masons' sand silo

Close-up of screening plant with re-washing unit to the right and Koehring clam-shell for reclaiming from storage



Electrically-driven American hoist with silent-chain drive for operation of slack-line cableway bucket

In addition to the 75-hp. motor driving the hoist and the 25-hp. motor direct-connected to the pump, the electrical equipment includes: a 10-hp. motor for sand drag, a 7½-hp. motor for the bucket elevator, a 7½-hp. motor for the screen, and a 1-hp. motor for driving the roll feeder over the horizontal screen.

Three men are needed for complete operation of the plant, including moving and loading out of cars. The new plant, which has a capacity of 35 tons of masons sand per hour, went into production in February, 1938.

Officers of the company, which also operates a plant at Follansbee, W. Va., are: W. A. Tisher, president; G. B. Clifford, vice-president; and W. J. Hukill, secretary-treasurer and general manager.

Concrete Aggregates for World's Longest Multiple Arch Dam

Obtain coarse aggregate from new quarry and sand by dredge from Arkansas river. Storage facilities provided for five sizes.

IN NORTHEASTERN OKLAHOMA, the Massman Construction Co. is building, for the State of Oklahoma, the longest multiple arch dam in the world, to be known as Pensacola Dam. In addition to the dam, there will be a great power plant containing four 20,000-hp. turbines driving four 16,000-kw. Westinghouse generators. Provision is made for the future installation of two more units of the same size.

Upon completion the dam will be 6150 ft. long and 150 ft. high with a highway over the top. In the east half of the dam is an 860-ft. gravity type spillway section having 21 tainter gates. East of the dam proper on the east side of the town of Disney are located two more emergency spillways having 10 tainter gates in one and 11 in the other.

There is approximately 500,000 cu. yd. of concrete involved in the job, which calls for huge quantities of coarse aggregate and sand. The coarse aggregate is obtained from Whitebird quarry, located 30 miles north of the dam site. A standard gauge railroad track, 1¼ miles long, was built to connect the quarry with the K. O. & G. railroad.

The quarry is operated by Jackson Materials Co., holding a subcontract to furnish 500,000 tons of crushed rock for the dam project.

Reversible Shuttle Conveyor Feeds Into Bins

Rock is quarried by drilling and blasting. Three 1-cu. yd. gas shovels load the blasted rock into eight 2-cu. yd. dump trucks that haul it a short distance to two gyratory crushers. A 30-in. conveyor belt, 275-ft. centers, transfers the crushed rock to the classifying screens located on top of the storage bins over the track from which point is is fed by gravity into bottom-dump cars. As the cars are loaded they are shifted down a ½ of 1 percent grade track to the scales where they are weighed and then moved on to the tail track. Empty cars are stored above the bins on a ½ of 1 percent grade down which they roll to the bins as they are needed. The Massman Construction Co. has exclusive use of the cars used and operates a 70-ton locomotive to bring the loaded cars over the K. O. & G. railroad to Grand River Junction, then over five miles of construction railroad to the dam site. Cars are shunted over a track hopper where they are dumped into two 12- x 12-ft. double-track hoppers with apron feeders. Both feeders discharge onto a 30-in. conveyor, 213-ft. centers, inclined up 18 deg. to a reversible shuttle belt conveyor, which in turn dumps the classified aggregates into the various stock piles. Construction details and illustration of this conveyor are shown on the following page.

The stock pile area consists of five areas separated by four bulkheads 60 ft. apart and 25 ft. high, capable of storing 2000 tons of each size aggregate and sand. These bulkheads were constructed of timber poles cut on the job and set in the

Above: Long conveyor leading to Blaw-Knox concrete mixing plant equipped with three 2-cu. yd. Koehring mixers and automatic batching apparatus

Right: Showing tunnel conveyor which goes under stock piles dumping aggregates into boot of elevator leading to concrete mixing plant

ground, (10 to each bulkhead, 10 ft. apart), then boarded up with plank and braced and guyed. On top of the bulkheads a 12- x 12-in. cap, 20 ft. long was bolted, and on this stands the steel columns that support the 60-in. trusses on which the shuttle conveyor operates.

Concrete Mixing Plant

Under the stock piles a 7- x 7-ft. tunnel was constructed of timber cut from native lumber. Gates in the roof of the tunnel under each stock pile feed the aggregate onto a 30-in. belt, 315 ft. long, which in turn dumps onto another 30-in. belt, 257-ft. centers, inclined up 18 deg. 30 min. to the top of the Blaw-Knox mixing plant, where a distributing chute distributes the correct size aggregate to the correct bin. There are six bins in the mixing plant, one for each size aggregate, one for sand and one for cement. From there the aggregate is fed by gravity to the batchers.

The Blaw-Knox mixing plant is equipped with three 2-cu. yd. Koehring mixers and all-automatic C. S. Johnson batching equipment, operated by a batcher operator, who varies the mixes as called for by pressing electric push buttons, which in turn operate air cylinders that control the gates in the bottom of the bins. The mixers are dumped by air from the mixer floor directly into 2-cu. yd. bottom dump buckets on 1½-ton White trucks that haul them to the various pours, where crawler cranes and whirleys on high gantrys handle the buckets to the forms.

Adjust Deficiency of Fine Sands

Sand is shipped in over the K. O. & G. railroad to Grand River Junction from a sand plant located on the south side of the Arkansas River

Conveyor elevating aggregates from railroad track hoppers to reversible shuttle conveyor operating back and forth over stock pile bins

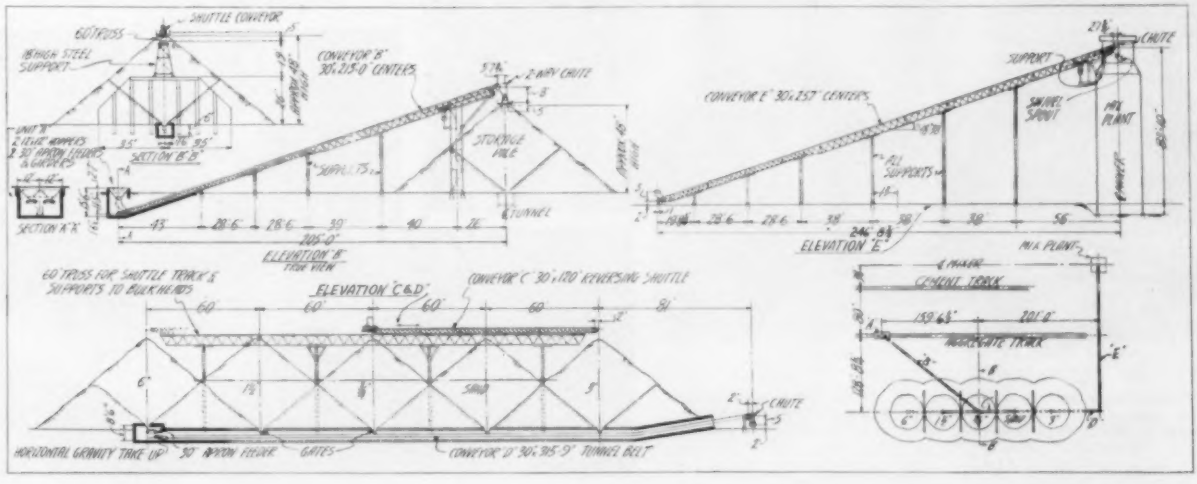
five miles north of Muskogee, Okla. The sand is pumped out of the river by a 10-in. suction dredge driven by two natural gas, semi-diesel International engines, all on a steel barge that is handled with quarter lines and anchors. The discharge line is floated ashore on pontoons, then up to the top of the washing and classifying plant. Classifying equipment consists of wood bins with screens so located as to screen out the excess sand retained on a 48-mesh screen. The bins discharge into the boot of a bucket elevator, which lifts the sand to a belt conveyor, 75 ft. long, that stock piles it where a gas crane equipped with a clamshell bucket can either load it into cars or build up adjacent storage piles for use during high water when the dredge cannot operate.

Owing to a deficiency of fine sand passing a 100-mesh sieve, it is necessary to add these fines to the product from another source. These fines are trucked to the plant from a pit about three miles away and shoveled by hand into the boot of the elevator where it is mixed with the river sand.

Sand is hauled from Grand River Junction, where it is set out by the K. O. & G. railroad and hauled to the job by the Massman Construction Co.'s locomotive. The cars are then unloaded through the track hopper and moved from thereon by the conveyor system handling the coarse aggregates.

Aggregate conveying equipment and the handling system at the dam site were designed especially for the job by the engineering department of the Barber-Greene Co., and all hoppers, feeders, and conveyors were furnished by this company. It is made up of standardized units that have a high salvage value, the frames consisting of easily assembled sections with detachable walk supports and handrails.

Below: Elevation and plant details of aggregate storage and concrete mixing plant for Pensacola Dam



Money In Flue Dust

Dust collection system installed at Medusa's Wampum, Penn., plant has recovered valuable product and improved working conditions

By BROR NORDBERG

IN CONTINUING a program to better mill operating efficiency, begun in 1936, Medusa Portland Cement Co. has just finished several installations at the Wampum, Penn., plant formerly operated by the Crescent Portland Cement Co.

In our most recent article on this plant (ROCK PRODUCTS, July, 1937, p. 42) we discussed the installation of Vanderwerp heat recuperators on each of the four kilns, air separation for raw material as well as clinker grinding, and a general re-arrangement of the entire flow of materials which combined to cut operating costs and to give a better cement.

The latest improvements comprise installation of cyclone-type dust collectors to recover flue dust from the gases escaping through the stacks and substitution of a new type of feeder on each of the kilns and grinding mills.

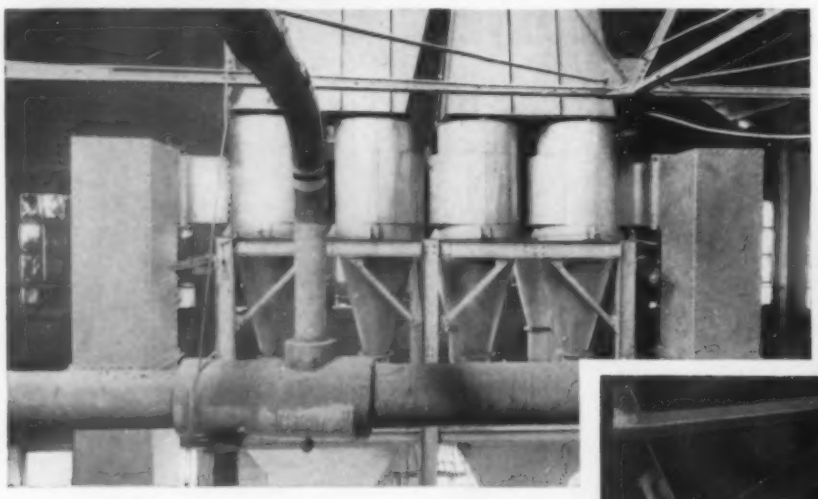
This plant is a dry process operation with waste heat boilers. Several years ago when two kilns were taken out of service, the common flue was sectioned off so that each kiln serves one of the four 750-hp. Edgmoor waste heat boilers giving a better kiln draft condition. A fifth boiler, an auxiliary of 1000-hp. rating, was equipped with a Blomatic stoker. In connection with the boilers, Greene fuel economizers were operated which have now been supplemented with Foster-Wheeler primary and secondary super-heaters. Gases formerly discharged through individual short stacks.

Left: Hoppers into which the kiln dust collector cyclones discharge precipitated flue dust. Each of the two nests of dust collectors discharges into a hopper and the hoppers discharge into a common screw conveyor

Operation of Dust Collecting System

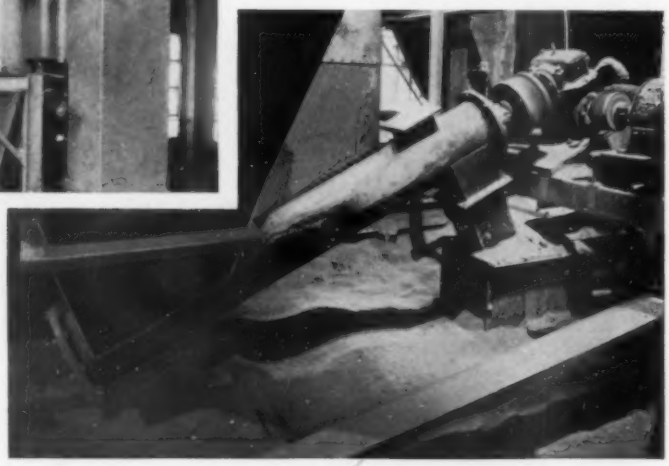
The new dust collectors, manufactured by Buell Engineering Co., Inc., New York, N. Y., were installed to recover much of the raw material pulled out of the kilns by the economizer fans which was lost as dust, to improve plant working conditions, and to relieve the dust condition in the surrounding country.

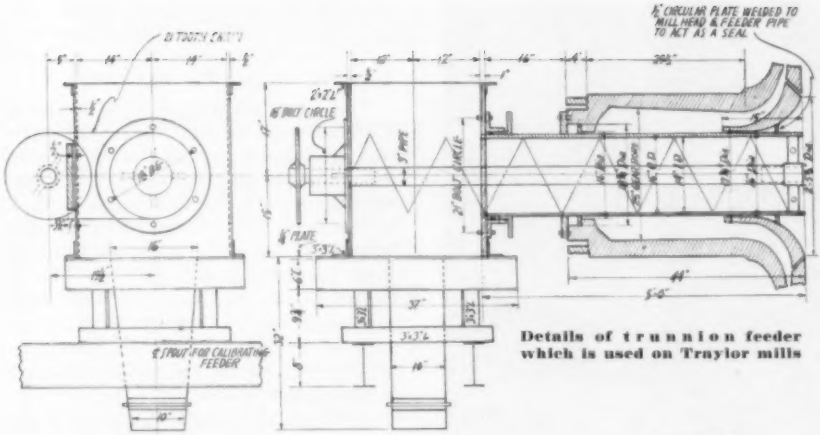
The collector for each kiln consists of a nest of four 36-in. cyclones which operate on the Van Tongeren system. These are the first of this type collector installed in an American cement plant although they are extensively used in other industries and in portland cement plants abroad. The collector has a spe-



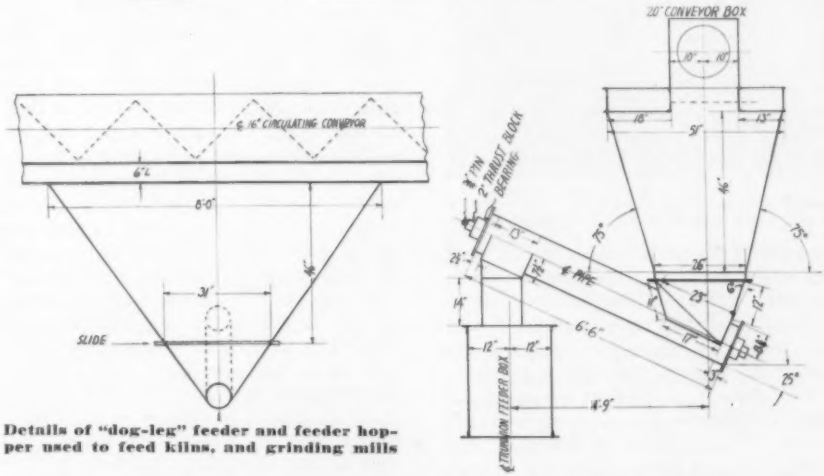
Above: Two nests of four 36-in. Buell dust collectors are operated with two adjoining kilns to trap flue dust. Note vertical duct channels and collecting hoppers below

Below: Inclined "dog-leg" screw conveyor, feeding one of the kilns, controls the feed of aerated material from open-top kiln feed bins and is instrumental in eliminating flooding of the kiln





Details of trunnion feeder which is used on Traylor mills



Details of "dog-leg" feeder and feeder hopper used to feed kilns, and grinding mills

cial duct channel which, according to the manufacturer, makes use of the double-eddy current set up by a stream of gas traveling a curved path for much of its operating efficiency.

Each economizer fan exhausts the dust-laden gases into a vertical channel duct having a right-angle bend at the top of the four cyclones or cells. At this point, in a horizontal chamber, the gases are split to the four cyclones by three vertical vanes so that the distribution will be equalized.

The nest of four cyclones serving each of two adjoining kilns is grouped, for structural strength of the supports, and the exhaust is through short stub stacks. Dust is precipitated into a small hopper, one for each kiln, each of which discharges to a common horizontal screw conveyor for transference by bucket elevator into a flue dust bin. Special sensitive valves in the hopper bottoms, controlled by the weight of the material resting on them, are used to discharge the dust into the conveyor.

Tests were recently completed by the Buell Engineering Co. to determine the efficiency of the collectors and results are as follows:

Test No.	1	2
Duration of test (minutes)	75	135
Barometer reading (inches of mercury)	30.12	29.194
Volume of gas sampled at duct temperature and pressure (cu. ft. per hr.)	1765	1074
Condensate	none	none
Volume of gas corrected for condensate (cu. ft. per hr.)	1765	1074
Dust sampled (grams per hr.)	79	45.1
Dust loading of gas escaping from collectors (grains per cu. ft.)	.685	.646
Average temperature in duct (deg. C)	188	188
Average static pressure in duct (in W. G.)	.0677	.0507
Gas velocity (f. p. m.)	1200	1252
Gas volume (c. f. m.)	27,500	29,750
Dust collection (lb. per hr.)	877.5	885
Dust loading reduction through collectors (grains per cu. ft.)	3.72	3.470
Dust loading of gas entering collectors (grains per cu. ft.)	4.405	4.116
Collection efficiency (percent)	84.4	84.2

The net effect of installation of the collectors on the kilns has been a loss of 2½- to 2¾-in. water gauge in draft. Whereas the fan housing doors were formerly opened to hold the kiln draft down, they are now kept closed with installation of the dust collectors. Dust precipitated is stored in a cylindrical bin, 21-ft. in diameter by 21-ft. high, located in line with the four 21- x 90-ft. raw material blending bins.

Flue Dust Sold to Farmers For Liming

Local farmers have found the flue dust of value for liming the soil and at times have taken practically the entire daily output of dust. A special loading spout has been provided for direct loading into cars. Dust not sold is blended into the fresh kiln feed material which is drawn from the adjacent blending bins, and the kiln feed mix is adjusted proportionately.

An improvement that has been of great value in regulating burning conditions in the kiln and the grindability of the clinker is a new system of feeding the kilns. Raw materials are pulverized through a Hercules mill followed by two 7- x 26-ft. Traylor mills in simple circuit with two 16-ft. Sturtevant air separators. The fines, 90 percent minus 200-mesh, are pumped into the blending bins by a 10-in. Fuller-Kinyon pump. From the blending bins, screw conveyors and bucket elevators were used to transfer raw feed to the 600-bbl. kiln feed bins. From these bins, straight screw conveyors were used to feed into the kiln feed pipe.

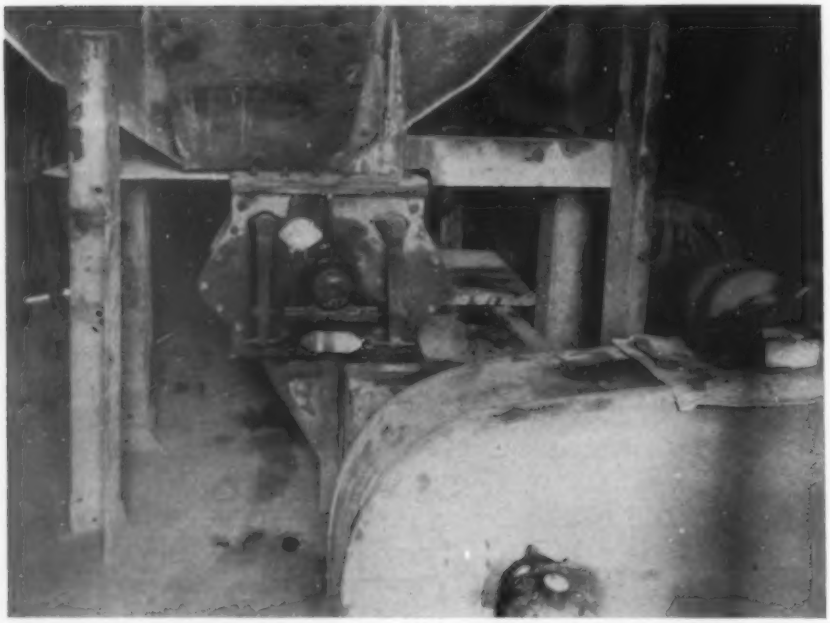
Aerate Kiln Feed to Prevent Surges

An entire new system of kiln feed was installed to eliminate the arching and subsequent flooding characteristic of this type of feed. The new layout is somewhat similar to methods used in the packhouses of some plants. Consisting of a series of open feed hoppers, use is made of a circulating load to keep the feed aerated and in a fluid state.

Blending bin feeders, of the star-type, were rebuilt into roll feeders, and are driven from a common line shaft by a variable speed 2-hp. d.-c. motor in order to get a positive control of flooding from the blending bins. Above the feed end of each kiln, an open top hopper has been installed of sufficient capacity to produce about 12 bbl. of portland cement clinker. These hoppers will empty themselves completely.

Raw material from the blending bins is carried by a 16-in. screw conveyor and a bucket elevator, 25-ft. centers, to discharge into another 16-in. screw conveyor which has a travel over the top of each of the four hoppers.

Operation of the blending bin feeders is by means of a variable speed drive regulated so that the feed is equal to or greater than the feed input to the kilns. The conveyor box is open over



Fuller rotary feeder driven by variable speed motor releases flue dust from a bin into a screw conveyor in reclaiming for blending with the fresh kiln feed from blending tanks

the feed hoppers, which are continually kept full, with the excess feed returning to the bucket elevator through a 12-in. return screw conveyor.

Automatically Regulate Material Going Through System

A rheostat is connected to the motor drives of the feed elevator, hopper conveyor and return conveyor to regulate automatically the amount of material going through the system. The blending bin feeder drive is automatically stopped (due to excessive amperage) when the return conveyor is overloaded and automatically starts up again when the overload is removed.

From the hoppers the kiln feed is kept constant through use of a dog leg feeder and trunnion feeder designed by Medusa engineers. The dog leg feeder is a short 12-in. screw inclined up at a 9-in. pitch. According to tests, the feed by this system, due in part to the maintenance of an aerated supply of raw materials, has been remarkably uniform. The original feed arrangement is retained for emergency service. The kiln-feed pipes are all water-jacketed.

As mentioned earlier, flue dust precipitated in the kiln stack collectors and stored in a separate bin is blended with the fresh kiln feed when not sold to farmers. In this bin is also stored the dust from the main boiler flues which is conveyed to it by screw conveyor and bucket elevator. Ducts lead to the collectors from the elevator and screw conveyor. Flue dust is fed from the bin to a screw conveyor by a Fuller No. 2 rotary feeder driven by a drive independent of the feed from the other blending bins when drawn to mix with the kiln feed. The drive here is also by variable speed motor with automatic shut-off, and the dust is blended with the fresh feed when conveyed into the kiln feed hoppers through the system.

The same type of feed arrangement, with modifications, has been installed on the Traylor mills in grinding. Two of these 7- x 26-ft. mills are closed-circuited with separate 16-ft. Sturtevant air separators on raw grinding, and an 18-ft. Raymond air separator with a double set of whizzers is in circuit with two similar mills in finish grinding of clinker.

Formerly 800 bbl. capacity overhead bins served each mill with feed from the Hercules preliminary grinding mills. Two of these bins are now out of service and one is used for each type of product feeding the corresponding Traylor mills. The hoppered bins have been cut off to give more head room and now have 7-ft. square flat bottoms.

Two short screw conveyors, driven by variable speed motors, release the material from each bin into a screw conveyor discharging to small feed hoppers for each mill. Here again the feed is slightly in excess of mill requirements, with the overflow returning into the large bin through a bucket elevator. In the same manner that the kiln feeds are automatically regulated, an overload, as evidenced by excess amperage drawn, will cause the screw conveyor feeds to stop.

The hoppers in turn feed into a dog leg feeder followed by a trunnion feeder which also rotates. Rejects from the separators return into the trunnion feeder. The trunnion feeder is driven from the mill drive gear. Having a type of mill feed that is uniform, without surges or too lean, has had a desirable effect in maintaining a constant and proper circulating load in grinding, which is essential in order to get capacity and proper surface. By enabling the separators to perform their proper function, the circulating load according to test, is practically constant. Normal cement is ground to a specific surface of 1770 sq. cm. per gram with a circulating load of 177 percent. A 152 percent circulating load is carried in manufacturing high early strength cement at 2750 sq. cm. per gram.

Two of the Traylor mills are equipped with Westinghouse Micarta main trunnion bearings, which are of pressed woven fiber composition and require only a continuous bath of water for lubrication. Kiln capacity of the plant is now about 145 bbl. of clinker per hour with three 8- x 125-ft. kilns and one 8- x 10- x 127½ ft., and the clinker grinding capacity is about 235 bbl. of standard cement per hour.

View of the end of the kiln building, showing short stub stacks through which the kiln gases discharge after passing through dust collectors

How Much Heat Recovered?

Analysis indicates that a clinker cooler saves more heat than its equivalent fuel

BY W. R. BENDY

A CLINKER COOLER which recovers 130,000 B.t.u. per bbl. may save substantially more than 10 lb. of 13,000 B.t.u. coal. This is a cold fact which can be calculated without assuming gains due to better flame conditions.

The reason is simple. When the heating value of a fuel is measured in a calorimeter, the products of combustion are cooled to room temperature, but no practical rotary kiln cools its waste gases to room temperature. Therefore, no kiln ever removes as many heat units from the combustion gases as the calorimeter says there are in the fuel.

On the other hand, heat recovered in a clinker cooler may be slipped into the kiln through a "back door;" combustion air has to go in any way, and it provides free admission. Heat taken in by preheating the combustion air is all at the disposal of the kiln, because it brings in its train no extra products of combustion to carry away heat in the waste gases. Of course, the kiln may waste some of the heat (by radiation, for example), but that is the fault of the kiln.

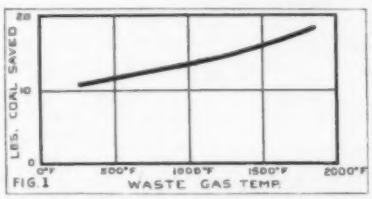


Fig. 1: Graph which shows the number of pounds of 13,000 B.t.u. coal which is saved by clinker cooler. The higher the waste gas temperature, the greater the advantage in heat recovery

The amount of heat recovered depends on the waste gas temperature. When the heat comes from combustion, a higher waste gas temperature means that more heat is carried out by the products of combustion and a smaller proportion is available heat. The heat which gains free admission with the combustion air is all available heat, regardless of the waste gas temperature.

With 13,000 B.t.u. West Virginia coal, the fuel saved by recovering 130,000 B.t.u. is shown below:

WASTE GAS TEMPERATURE	LBS. OF COAL SAVED
70 deg. F.	10.0
500 deg. F.	11.5
1000 deg. F.	13.2
1500 deg. F.	15.7

Fig. 1 shows graphically the increasing rate of heat recovery with higher waste gas temperatures. The higher the waste gas temperature, the greater is the advantage in recovering heat from the clinker. Hence, clinker coolers are more profitable on dry process kilns than on wet process kilns.

In this study, consider an ordinary West Virginia kiln coal of the following analyses:

PROXIMATE ANALYSIS AS FIRED	
Moisture	1.6
V.C.M.	35.7
F.C.	53.2
Ash	9.5
Total	100.0

ULTIMATE ANALYSIS AS FIRED	
Hydrogen	4.8
Carbon	75.1
Nitrogen	1.3
Oxygen	5.8
Sulphur	1.9
Moisture	1.6
Ash	9.5
Total	100.0

Heating value: 13,000 B.t.u.

One pound of this coal requires 10.142 lb. of air for perfect combustion and produces: H_2O, 0.455 lb., CO_2, 2.753 lb., SO_2, 0.038 lb., N_2, 7.811 lb.

The heat content of these combustion products must be subtracted from the heating value of the coal to obtain the available heat which is illustrated in the tabulation below.

The available heat in one pound of coal with relation to waste gas temperature is illustrated graphically in Fig. 2. With a waste gas temperature of 500 deg. F., the available heat of the 13,000 B.t.u. coal is 11,333 B.t.u. per lb. Therefore, 13,000 B.t.u. of recovered heat is *not* the equivalent of one pound of coal, but of 13,000 ÷ 11,333 = 1.15 lb. of coal. At 1000 deg. F., the equivalent is 1.32 lb., and at 1500 deg. F., 1.57 lb.

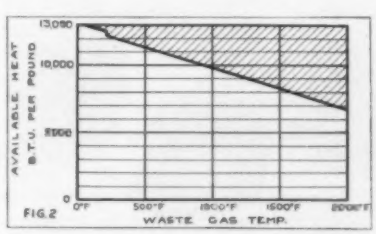


Fig. 2: Available heat in one pound of coal with relation to various waste gas temperatures. Shaded area represents heat lost in combustion products

AVAILABLE HEAT PER POUND OF COAL AS FIRED

Waste Gas Temperature	Heat in Combustion Products B.T.U.	Heat in Coal B.T.U.	AVAILABLE HEAT B.T.U.
70 deg. F.	....	13,000	13,000
500 deg. F.	1667	13,000	11,333
1000 deg. F.	3150	13,000	9,850
1500 deg. F.	4695	13,000	8,305

Chemist Corner Author

Starting in the cement industry in 1921, the author of this month's article, W. R. Bendy, has had practical experience at 19 different plants while in the employ of several cement companies and the Portland Cement Association. He is now in business as a cement engineer.

From 1929 to 1938, Mr. Bendy was an engineer on operating, manufacturing and technical problems with the Lone Star Cement Corp.

Simplify Specifications

Article 4.—Screen analyses of crushed stone and laboratory equipment to determine whether product is meeting specifications

By ELWOOD T. NETTLETON

RECENTLY several state testing engineers called a conference inviting approximately 100 producers within the territory. About 30 of the most progressive producers appeared. Of this number only two producers had any record of screen analyses of their stone, neither of which was extensive enough at that time to aid in arriving at any economic and practical solution.

Perhaps a series of questions would drive home to the average producer his lack of knowledge concerning his own manufacturing and product:

(1) How much difference does a change in specifications from 2⅝ in. (square mesh)—1½ in. to 2½ in.—1½ in. affect your production tonnage?

(2) How much larger should the openings of your quarry screens be than those in the testing screens?

(3) What is the efficiency of a vibrating screen as compared with that of a revolving boiler plate screen of same size apertures?

(4) What is the percentage of dust coating on your stone crushed in wet weather?

(5) To what extent is elongation of stone affected by type of crusher, initial crushing, recrushing, and physical properties of the stone?

(6) A contractor wants a price on stone meeting the following engineer's specifications: passing 2 in. (square mesh) = 100 percent; passing 1⅞ in. = 95 to 100 percent; passing 1½ in. = 30 to 60 percent; passing 1 in. = 0 to 25 percent; passing ¾ in. = 0 to 5 percent. Under normal conditions, without overloading the screens, does stone that is screened at your plant through a 2⅛ in. round opening and retained on a 1 in. square opening, meet this specification so that you may quote prices? If your stone does not meet this, what changes would you have to make? At what cost? How would this affect or interfere with your other business?

(7) You have just broken a set of punch plate screens of square openings, size 1½ in. The only screens you can obtain in the emergency is a set of smooth boiler plate screens of various round openings, all worn larger from 0 to ¼ in. diameter from the original. What screen should you choose from the following to assure yourself the product specified (1½ in. square): 1¼ in., 1⅜ in., 1½ in., 1⅝ in., 1¾ in., 1⅞ in., 2 in., 2⅛ in.? Percent passing square-mesh testing screens

	2½ in.	2¼ in.	2 in.	1¾ in.	1½ in.	1 in.	3/7 in.	¼ in.
A	100	95-100			0-10			0-5
B			100	95-100		0-10		0-5
C				100	95-100		0-10	0-5

(8) In a conference with engineers on specifications they desire to set up a specification as follows:

Is 5 percent allowance for oversizing fair and obtainable in good current practice? Is 10 percent allowance for undersizing fair and obtainable in good current practice? Is 5 percent allowance for chips, dust coating, etc., fair? Is there any reasonable manufacturing objection to the overlapping of size B on both A and C?

(9) Your plant screens are at present as follows:

2½ in.—1½ in. (square) Size A Stone

1½ in.—1 in. (square) Size B Stone

You change these to:

2½ in.—1⅝ in. (square) Size A Stone

1⅝ in.—1 in. (square) Size B Stone

What percentage of your crusher

Comparison of relatively flat, above, with cubical stone, below

run was formerly A? What was formerly B? What is it now for A? What is it now for B?

(10) Are any of your quarry screens over-loaded? To what extent?

(11) You install a 1 in. square woven wire manganese screen in

Torsion balance is a valuable piece of laboratory apparatus

place of 1 in. square offset punch plate. How has this change affected your undersizing?

I think these examples speak for themselves, inasmuch as very few producers could answer these eleven questions with anything better than a general assumption.

Because of this lack of knowledge by producers, is it strange that producers allow specifications to be set up in February, only to find in July that they are not able to meet them? Realizing this, they are forced to provide a different gradation of stone than specified, and they hope the change will pass unnoticed, or that the inspector will be lenient. Is it a wonder that an efficient, honest inspector might assume that the producer was trying to get away with something?

Testing Laboratory

As noted in the first installment of these articles I have had considerable experience in the crushed stone industry as a producer executive. With my former employer's permission, I will therefore draw on this experience to illustrate just how I went about to establish a little testing laboratory and what it cost. While I have emphasized the size of this company's operation, it should not be concluded that a smaller company would not profit as much from a laboratory of its own.

The present New Haven Trap Rock Co., New Haven, Conn., with an investment of three million dollars in plants, property and equipment, is probably the largest producer of crushed trap rock in the United States, and possibly in the world. There are other quarry companies whose gross tonnage exceeds this company's, but they crush a different material which in most cases is limestone.

This company, at the present time, owns eight quarries of which number only five or six have been operating the last two years. All these plants are located within the State of Connecticut at the following points: Middlefield No. 1, Meriden No. 2, Rocky Hill No. 3, Plainville No. 4, Granby No. 5, Cheshire No. 6, North Branford No. 7 and New Britain No. 9. In addition to these quarries, the company also operates four distributing plants to which crushed trap rock is shipped either by rail or water direct from the quarries.

Set of hand testing sieves being used to make a size analysis

These four distributing plants are located at Bridgeport, Conn., Providence, R. I., Larchmont, N. Y., and Woodlawn (Bronx), N. Y.

The economic sales area for this company embraces the following: Connecticut, Rhode Island, and certain sections of Massachusetts and New York. The average annual business for the past few years has been 750,000 tons.

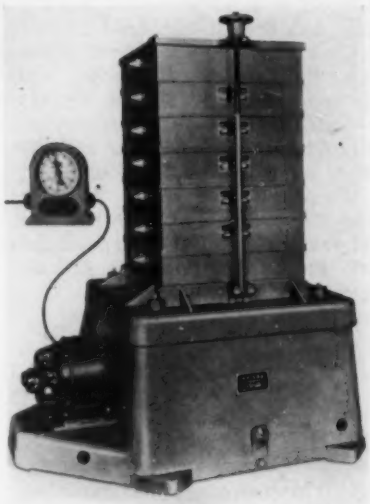
The New Haven Trap Rock Co. was at the time of installing a laboratory attempting to meet approximately 40 different specifications. No two of the six operating quarries are equipped alike. Only a few scattered tests under unlike conditions were at our disposal. Several thousands of dollars were being paid out annually in adjustments besides loss of good will. As a consequence I recommended the installation and equipment of a laboratory containing a "Ty-Lab Tester," and the temporary engagement of an assistant under my jurisdicition.

The recommendation was approved. A Ty-Lab Tester was purchased in June, 1936, and set up permanently in a wing of the company's repair shop, located in Cheshire. An undergraduate engineering student was hired. We were fortunate in obtaining one who had had experience in testing work at the Connecticut state highway department testing laboratory. After about one week's instruction he was in excellent shape to carry on the routine work under instructions.

The state highway department was informed of the establishment of a testing laboratory by this company and it offered the assistance of both its construction and testing departments. By means of this coöperation, it was possible to run many check tests and exchange information since the state had an identical testing machine.

Inasmuch as it was deemed of the utmost importance that all knowledge of operating conditions and the various other factors entering into the sizing of a particular sample of stone be known, at least 95% of the samples were taken by the writer. The number and the diversity of tests were all determined by the writer.

The laboratory assistant was employed for approximately ten weeks,



"Ty-Lab" tester for checking stone gradation

from July 1 to September 15. As a result of these tests, the next summer the writer recommended that a small portion of the central repair shop be adequately fixed up for a permanent laboratory and that an

(Continued on page 38)

Washing—Classifying Sand

Part 3.—On the theory and practice of washing. Describes various methods and gives washing efficiency computations

By EDMUND SHAW

It is possible to compute the efficiency of the washing, with a given amount of water, with no more testing than is needed to find the percentage of clay in the sample.

As a preliminary, the sample is usually weighed damp and then dried to constant weight and reweighed. The loss in weight is taken as the moisture in the sample. The weighed sample may then be washed to remove the clay and the sand dried and weighed, and the difference taken as the clay content. If the clay tends to bake on the grains of sand, a sample of the right weight to give 100 grams or a multiple of 100 grams dry weight may be taken. Thus, if there is 9 percent moisture, a weight of 111 grams will give 100 dry grams, or near enough for practical purposes. The damp sample may then be washed to remove the clay.

It will be assumed that the clay has been found to be 15 percent of the dry sample, and that it has been decided to use a 6 to 1 dilution, or 600 grams of water for the 100-gram sample. (Of course any weight may be used, but 100 grams are used here to simplify the work.) With 15 grams of clay and 600 grams of water the dilution would be 40 to 1, the percentage of solids, 2.44, and the specific gravity, found as described above, would be 1.018. It is supposed the specific gravity of the solids is 2.63, the specific gravity of silica.

It is known that the settled sand, after the clayey water has been drawn off, will have a specific gravity of 1.76. Then we may set up the equations.

$$2.63x + 1.018y = 176$$
$$x + y = 100$$

That is, the percentage of sand times its specific gravity plus the percentage of clayey water times its specific gravity equals 100 times the specific gravity of the pulp of settled sand.

Solving, we find that $x = 46\%$ and $y = 54\%$.

It has been found that this 54 percent of clayey water has 2.44 percent of clay, and 2.44 percent of 54 percent is 1.318 percent. The percentage of clay in the sand is 46 divided by 47.318 which is 2.79 percent. So 6 to 1 is about the lowest dilution it would be safe to use with a limit of 3 percent in the specifications. If the clay should be raised to 16.1 percent the sand would (theoretically) contain 3 percent of clay after washing with 6 to 1 water.

Counter-Current Washing

In theory there is no difference in using the same amount of water in one wash or two. The advantages are all with one large wash, because the clay is so much more diluted and easier to get away from the sand. In some other industries it is common practice to give a series of washes, and where the amount of water is very large this allows a smaller plant to be used. But I have never seen this practice followed in washing sand.

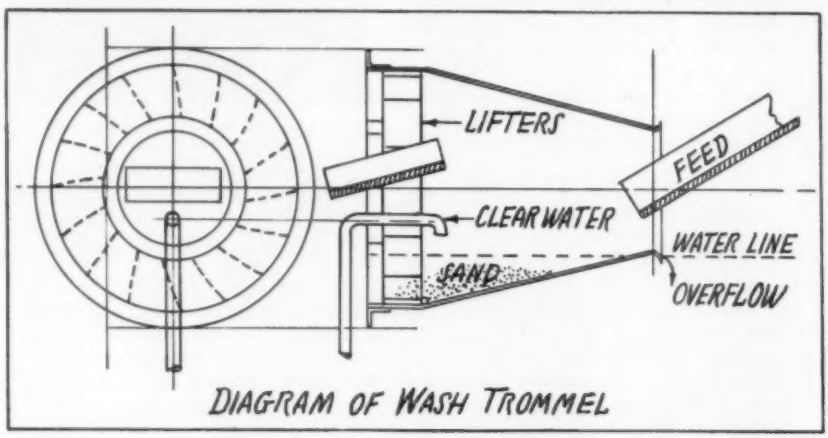


DIAGRAM OF WASH TROMMEL

However, rinsing has to be done where the first wash is not sufficient to remove the clay below the limit, also where such substances as tannic acid have to be removed. The commonest way of rinsing for this purpose is to wash with sprays in some machine that will give a dry product. The sprays break up the mass of grains and wash off the adhering clay very thoroughly, with very little water as compared to that necessary for some other kinds of washing. This is because of the counter-current action.

Counter-current washing, as the name implies, is washing by a current of water that flows against the flow of the sand. The clear water of the sprays flows down and over the sand rising with the rakes or drags.

Washing by displacement is a kind of counter-current washing. The slowly rising water moves against the downward fall of the sand grains. But the term is generally applied to conditions in which the flow of both water and sand is horizontal.

The method was one of the earliest applied in Europe to washing iron ore, and a rough sectional sketch of an old machine is given here. The conical body has tire and trunnion mountings and is driven by a gear at the end not shown. The feed goes into the small end of the machine and the clear water into the large end, where there is a body of water held by a circular dam. The opening in the dam is smaller than the opening in the small end, so the water overflows at the small end. At the large end there are flights which lift the settled sand to the discharge spout. The slope of the body and the rotation carry the sand to the discharge end, but lifters are sometimes put in to speed the forward movement.

This machine has been made in a

variety of ways, a cylinder set with a slope being a common form. In one modern form a screw is used to give a positive motion of the sand against the water. These forms will be described in detail under classifiers.

Washing By Displacement

There are two or three methods of washing by displacement, the most usual being to pass the stream containing the sand and clay over an opening through which a stream of clear water rises slowly with just enough velocity to lift the clay but with too little velocity to prevent grains of sand from settling.

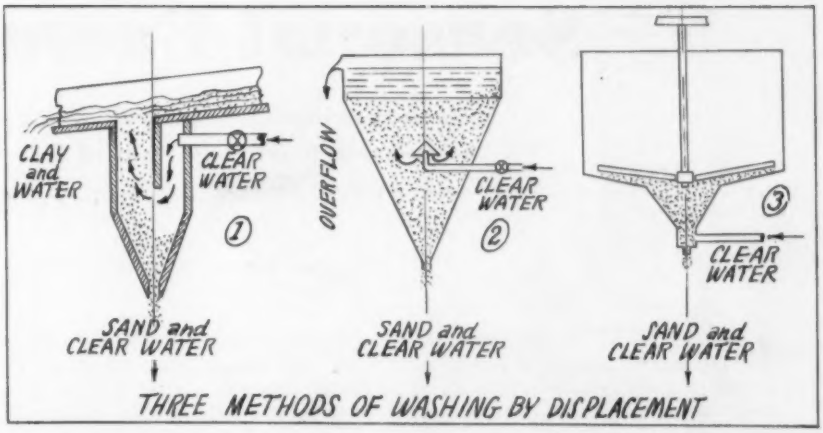
The rising water is called hydraulic water, and the device is called a hydraulic classifier. In this form it is more often used to separate fine sand from coarse sand than to separate clay from sand.

A second displacement method is to have the sand settle in a thick pulp in a cone or inverted pyramid, from which it discharges at the bottom while an equal amount is added at the top. A small pipe carries water to the center of the mass, discharging under a conical cap that acts as a spreader. With just the right amount of water admitted, the water will percolate slowly through the mass of grains with a slight upward current that will lift the clay without disturbing the settled sand very much.

A third method is used with those classifiers that collect the sand in a circular tank and draw it by revolving rakes to a central discharge opening. Water is admitted to provide a body of clean water in which the sand is washed as it is gathered by the rakes. It also forms a slow rising current in the body of the tank which wholly or partly prevents clay from settling.

This is a very efficient method, and it has been applied in recent years to collect and wash fine sands from the overflow of sand washing. Such fines are in greater demand than they used to be, because it has been found that they are necessary for the grading of concrete sand.

Displacement washing is thorough and it requires very little water because the velocity of the rising current is so slow, from 2 mm. to 5 mm. per second, where only clay is to be lifted. But the mechanical difficulties of applying it are considerable, and the effect of the rising current is greatly modified by changes in the feed, not only in the amount of solids but by changes in the grading. Many coarse sand grains coming at once will increase the velocity of the rising current temporarily and throw out fine grains that should settle. Eddy currents present another difficulty. But these matters will be discussed at length under classification.



THREE METHODS OF WASHING BY DISPLACEMENT

Removing Lignite and Trash

The removal of lignite, chips and trash from sand is usually by displacement washing, sometimes combined with screening. The first of the displacement methods shown in the cut is a diagram of a device which has been used for this purpose, and for washing fine coal. It depends on adjusting the flow of clear water to the incoming sand so that a mass of grains suspended in water is maintained in the chamber into which the sand falls. This mass has a specific gravity of 1.50 to 1.55. Lignite, which has a specific gravity of 1.40 or so, will not settle in such a medium, but will float over in and go out with the overflow. The original Shaw classifier was designed by the writer to remove lignite from sand; and it has been successful in this work.

Many machines to use this principle have been invented. One of the most ingenious is the Chance coal washer which has methods of screening out any sand that floats off with the coal and returning it for re-use.

Water-soaked pieces of wood and bark may be floated off in the same way. But shale, dried clay balls, and some other substances of the same kind, are better removed by jigs and concentrating tables.

Summary

(1) The three ways of washing are, by filtration, by dilution and decantation, and by displacement. The first method is used with coarser materials, the second and third are employed in many forms of sand washers.

(2) Washing by dilution and decantation is the commonest method of washing sand. The sand is settled in a box, tank or pool, and the clay is carried off by an overflow. The settled sand is removed continuously or intermittently. Continuous discharging may be by flowing out as a thick pulp (cones and settling boxes) or by mechanical means (wheels, buckets, drags, rakes and screws). Intermittent discharge may be by such means as a crane with clamshell bucket.

(3) For successful washing, (*a*) The clay must be free from the grains; (*b*) There must be enough water so that the percentage of clay is small; (*c*) The plant must be properly designed to handle the tonnages of water and solids.

(4) Jet scrubbers and mechanical scrubbers are in use, but the latter are more efficient. However the jet may find some use as an auxiliary.

(5) There are two kinds of clay met with in sand washing. One that is high in colloidal clay is hard to settle and tends to hold up fine sand by forming a dispersed system that resists the fall of sand grains. More water is required with this kind of clay. Clay containing little colloidal material, the other, offers no special difficulty.

(6) The efficiency of washing, the amount of water needed and the clay remaining in the sand may all be calculated in advance by the methods given.

(7) An excellent method of rinsing is spraying with clear water as the sand is dragged up an incline.

(8) In counter-current washing the flow of the wash water is against the flow of the sand. It is economical of water and may be used for a first wash or for rinsing.

(9) Displacement washing is applied in different ways. The simplest in principle is by the use of a rising current, but in practice it offers difficulties. A second method is to inject water in a mass of settled grains, and a third is to use clear water in the bottom of a collector of the thickener type.

(To be continued)

Seasonal Exemption

Open hearings on applications for seasonal exemption from provisions of federal wage and hour law by aggregates industries

By BROR NORDBERG

EVIDENCE as to reasons why the aggregates industries should be exempted from certain provisions of the Federal wage and hour law on the basis of seasonality were presented by the National Sand and Gravel Association, National Crushed Stone Association, and National Industrial Sand Association when representatives appeared before a board of examiners on September 19 and 20 in Washington, D. C.

HAROLD STEIN, assistant chief, Hearings and Exemptions Section, Wage and Hour Division, Department of Labor, and his assistants conducted the hearings and cross-examined the various witnesses.

Sand and Gravel

V. P. AHEARN, executive secretary of the National Sand and Gravel Association, was the first witness on behalf of the sand and gravel industry. Mr. Ahearn briefly discussed the nature of the sand and gravel industry, the scope and membership of the Association and stated the basis for which exemption claims were asked.

J. R. THOENEN, U. S. Bureau of Mines, whose knowledge of the industry and its practical problems carries with it the authority of years of experience, described the various types of operations broken down into bank deposits, pit deposits, marine operations, etc., and operating procedure in each case. Aside from his informative testimony on plant operation and variables in deposits and the topsoil covering each, he emphasized that aggregate must be washed and that below freezing weather makes operation prohibitive. When the gravel is frozen in the bank it cannot be excavated by ordinary methods, and ice formation prevents screening, said Mr. Thoenen.

STANTON WALKER, director, engineering division, National Sand and Gravel Association, briefly summarized a report "Seasonal Characteristics of the Sand and Gravel Industry" which had been prepared for the purpose of the hearing and which was entered complete into the record.

In the summary of the data received, the states were divided into four groups, each group to include states of approximately similar seasonal characteristics as determined by a study of data furnished by the U. S. Weather Bureau. In group 1, which embraced states subject to severest climatic conditions, the tabulation from 85 plants showed the operating season to average seven months, from about April 15 to November 15, and that less than 1½ percent of the man-hours in production were worked in the five remaining months. Most of the plants showed no work during these months.

Group 2 tabulation, covering those other northern states subject to heavy winter seasons but less severe than group 1, revealed that about 91 percent of the material was produced in eight months. For group 3, reports of producers in Maryland, W. Virginia, Virginia and Kentucky, did not show very different results. Seven plants in group 4, southern and northwestern states, did not show any well-defined seasonal characteristics as far as averages are concerned, although individual plants did.

Production tabulations, similarly grouped, paralleled the man-hours figures, with the states in groups 1, 2 and 3 again showing marked seasonal characteristics.

WILLIAM E. HOLE, secretary, American Aggregates Corp., Greenville, Ohio, another witness, described the types of operations in the 11 plants operated by his company in Ohio, Michigan and Indiana. These operations include five which have suction dredges in self-created ponds and six wet-pit deposits operated by draglines. Mr. Hole emphasized that screening was impossible without the use of water, which also is necessary for the production of sand by flotation and settling. The average operating season for these plants is April 1 to November 15.

IRVING WARNER, Warner Co., Philadelphia, Penn., in his testimony went into some detail on the nature of the industry and the demands placed on it by consumers. He said that even if there was a customer demand for sand and gravel, it was absolutely necessary to shut down his plants when the temperature dropped 1 or 2 deg. below freezing. He referred particularly to two large plants operating in lakes. The industry was described as a "semi-service" industry, selling a low cost commodity which must be produced at low cost. He stressed that no fraction of the plant can be operated without full operation and that the entire plant must be run for extra hours to meet consumers' demands for service. In recent years he said that there had been more than ordinary work put in on rehabilitation during winter months to compensate for the lean, depression years when such work had been put off. He concluded with the remark that the men desire long hours in the summer months to make up for the lean months, and in that regard, called attention to the fact that the nature of the work done by operating men is such that longer hours do not subject them to undue strain.

H. N. BATTJES, Grand Rapids Gravel Co., Grand Rapids, Mich., discussed seasonal conditions affecting operations of his company's two plants. Both plants are dragline-operated to depths of 10 to 20 ft. below water. The operating season is April 15 to November 1. Mr. Battjes said that at temperatures of 20 to 25 deg. the gravel bank freezes and cannot be handled. These temperatures and lower make it impossible to feed material to conveyor belts and clog the screen openings. He submitted a temperature chart for four years which showed an average temperature of 22 deg. for the off-season months. In the summer months his practice is to produce and stockpile some 10,000 to 15,000 cu. yd. of material for shipments during the non-producing months. After November 1, about 20 percent of the men are employed on repair and the remainder are laid off. The men at

these plants want all the work they can get during the summer months, said Mr. Battjes.

S. C. HADDEN, executive secretary, Indiana Mineral Aggregates Association, Indianapolis, Ind., testified on behalf of Indiana sand and gravel producers and later at the crushed stone hearing represented the stone producer members in that hearing. Mr. Hadden defined the operating season in Indiana as April 1 to December 1, covering 90 percent of the production in that state.

C. C. SLIDER, E. T. Slider Co., New Albany, Ind., told of the effect of climate on river operations. His concern operates dredges on the Ohio river. Mr. Slider gave the months of December through March as unfavorable to operation. During these months the plants are inactive, but about 30 percent of the men are retained on one-half time for repairs. Floods, swift currents and freezing water prohibit winter operation.

Witnesses' testimony was followed by a cross-examination to develop further details. Answers to direct questions were that none of the plants are equipped for heating, that there is a complete cessation of operations from May-October in the colder states, that two or three shifts or the use of swing shifts are impractical, that very little hand work is done, that stockpile delivery is emergency operation and that inability to transport by water will stop operations even if materials can be produced. Additional evidence is to be presented by the Association on the few plants that occasionally operate during off-season months, on plants in groups 3 and 4 and as to how many weeks employes work in excess of 44 hr.

Crushed Stone

NATIONAL CRUSHED STONE ASSOCIATION likewise had a representative, expert group of witnesses to offer testimony as to why exemption should be granted. Testimony was offered on the basis of seasonality of the industry and also on the basis of vanishing markets.

O. M. GRAVES, president, General Crushed Stone Co., Easton, Penn., as first witness on behalf of the Association, described the nature of the industry and the various operations which take place. He called attention to the fact that operations in the industry closely parallel sand and gravel production, that the same type of equipment is generally used and that the products are used for the same general purpose. Blasting was mentioned as the chief operating difference. Mr. Graves commented on the increasing rigidity of customer specifications, the lack of a market at certain times of each year, the necessity for washing stone and other pertinent information. His estimate was that 75 percent of the production of the industry was used for railroad ballast and highway construction.

As part of the evidence, the data and information contained in "Application for Seasonal Exemption of the Crushed Stone Industry Under the Fair Labor Standards Act of 1938" was written into the record.

J. R. BOYD, executive secretary, National Crushed Stone Association, as a witness, discussed some of the statistics. He suggested that the recent studies of WPA and the U. S. Bureau of Mines on labor in the crushed stone industry might be of value in interpreting the case, and a study is to be made of these records.

A. T. GOLDBECK, engineering director, National Crushed Stone Association, was asked on what basis the country had been subdivided into three groups for the study. Mr. Goldbeck called attention to the fact that the demand for crushed stone is seasonal because of the seasonality of the construction industry. He referred to a study he had made of specifications of 31 highway departments which vary somewhat in the types of construction and in the minimum temperatures stated therein below which construction is stopped. Some of these specifications mentioned 35 or 40 deg., some 50 and even 60 deg. as the limits below which construction of the various types should not proceed. He also referred to standards for subgrade work which materially affect the time when actual construction may start.

E. F. KELLY, chief, Division of Tests, U. S. Bureau of Public Roads, discussed restrictions placed on the use of aggregates by specifications, particularly in regard to temperature limits. The extent of the restriction due to temperatures varies with latitude and altitude and limits considerably the number of months for which there is a market for crushed stone in the northern states and to a lesser degree in the warmer states, said Mr. Kelly.

F. C. SQUIRE, valuation engineer, Association of American Railroads, discussed the tabular information submitted on the seasons when tracks are ballasted. Most ballast is placed from May-October, and after frost and excess moisture is removed from the ground, said Mr. Squire, these conditions setting a definite period when ballast stone is used. Increased rail traffic was given as another reason for a shorter buying season for railroad ballast.

O. M. GRAVES called attention to the fact that this evidence had been submitted in support of a claim that vanishing markets were responsible for seasonality in the industry. He called attention to the determination of whether or not an industry is seasonal as set forth in Section 526.3 of the Regulations. This condition sets forth that to be eligible for exemption an industry "ceases production, apart from work such as maintenance, repair, clerical and sales work, in the remainder of the year because of the fact that, owing to climate or other natural conditions, the materials extracted, or processed, in the form in which such materials are handled, extracted or processed, are not available in the remainder of the year."

Mr. Graves called attention to the true meaning of the word "available" which is "usable" or "capable of being used to advantage" and contended that crushed stone during the idle winter period is not "usable" or "capable of being used to advantage" because "climate" prevents it.

Following this testimony, witnesses from within the industry gave testimony on seasonality from the operating standpoint. A. J. Cayia, general superindendent, Inland Lime and Stone Co., Manistique, Mich., set forth April 15 to September 15 as the operating season in that part of the country. This plant depends for transportation on the waterways and has no outlets to markets during the freezing months.

E. J. KRAUSE, Columbia Quarry Co., St. Louis, Mo., told of the attitude of labor in his general territory to hours of employment as shown in union contracts. The men want long hours in the summer to make up for meager pay checks in the winter. These contracts, which have been effective 5 or 6 years, set an 8-hr. day, with a 10-hr. day during the busy season, with time and one-half to be paid for time over 10 hrs. in one day. Mr. Krause mentioned the difficulties in screening and grading materials due to alternate freezing and thawing conditions. The working season in that locality is April 1 to December 1.

J. R. THOENEN, U. S. Bureau of Mines, in reviewing his observations, stressed the impossibility of sizing and screening material in sub-freezing temperatures.

E. T. NETTLETON, engineering director and secretary, New York State

Crushed Stone Association, said that in his previous experience as a highway engineer no inspection of highways and quarries was conducted in the winter. Speaking for New York and New England, he defined November 15 to April 1 as the idle period.

H. H. WAGNER, general manager, Pennsylvania Crushed Stone Association, said that in Pennsylvania it was absolutely impossible to operate in the winter. Due to seams and fissures in most of the rock ledges, water seeps in and freezes mud and clay to the stone, which cannot be removed from the stone. Overburden is comparatively light and freezes to the stone, making its removal impossible, said Mr. Wagner.

S. C. HADDEN, executive secretary, Indiana Mineral Aggregates Association, Indianapolis, Ind., gave December 1 to April 1 as the off-season for Indiana crushed stone producers.

RUSSELL RAREY, Marble Cliffe Quarries Co., Columbus, Ohio, listed the operating periods for crushed stone operation at his plants and for sand and gravel as well, which showed an average of about 4½ mos. shutdown for each of the years 1936, 1937 and 1938. Reasons for the shutdowns were given as a lack of market and difficulties of operation.

A. L. WORTHEN, New Haven Trap Rock Co., New Haven, Conn., with nine plants, said that stripping operations began in April. Drilling, according to his experience, is too expensive in the winter because of climatic difficulties, with the possible exception of tunnel drilling, which is but a small percentage of that done.

Industrial Sand

Several producers of industrial sands for many applications appeared as witnesses supported by the National Industrial Sand Association to give testimony as to why their operations are seasonal. The Association had written to all members of the industry inviting the participation of companies who felt that their operations were seasonal.

L. M. HANSEN, Industrial Silica Corp., Youngstown, Ohio, described his company's operations, which include steel and foundry sands, molding sand, core sand and sand blast sands produced in four plants. These plants are located in towns numbering less than 500 population each, thereby limiting sources of labor, said Mr. Hansen. He emphasized the close limits of gradation which must be met and the wide variety of grades, touching on the general operating processes. Washing is done in two plants and the source of water depends upon rainfall. Production is stopped during periods of drought. The operating season is about April 1 to December 1. Mr. Hansen testified that frozen rock, which must be broken down to grain size, cannot be handled, that freezing temperatures cause air lines and switches to freeze and very high cost maintenance. The workers desire long hours and it is unsatisfactory to attempt to get part-time men, said Mr. Hansen, to work a few hours over the 44 specified by the law.

J. M. STROUSS, Deckers Creek Sand Co., Morgantown, W. Va., described his operations, from which are produced glass sand, engine sand and filter bed sand, involving quarrying, crushing and washing. One plant is located high on a mountain, where water is absorbed and freezes—greatly reducing production efficiency. Mr. Strouss submitted records to show the man-hours worked in a given year.

CHARLES J. NIESEN, The American Silica-Sand Co., Ottawa, Ill., appeared as a witness in behalf of all the producers of crude silica sand in that locality. He testified that production could continue for 12 months but that 90 percent of the production was done from April 1 to December 1. During the other months he said that loading was difficult, and emphasized that sand containing up to nine percent moisture would freeze solid in cars upon arrival at destination.

E. J. BEYER, Michigan Silica Co., Rockwood, Mich., producing glass sand, testified that only 32 weeks of the year were suitable for conducting stripping operations. The sand is covered with 18 to 22 ft. of heavy clay which would freeze and require blasting.

EMERY M. DURSTINE, The Keener Sand and Clay Co., Columbus, Ohio, a producer of naturally-bonded molding sand from three plants, said that with a 44-in. thickness of bed under 10-in. of topsoil the pits freeze solid from top to bottom, making it impossible to operate in cold weather. The loading season is April to November, with about 87 percent of the production in eight months.

J. R. THOENEN, U. S. Bureau of Mines, in observing on operating conditions generally, discussed the several types of deposits and operations. He pointed out that one type of product requires the washing out of clay and other foreign matter and that another requires the retention of clay, and therefore dry screening.

Simplify Specification

(Continued from page 33)

assistant be employed again, for the summer, to run re-check tests and to do further research tests which appeared advisable.

This recommendation was accepted and the same assistant was again employed, this time for a period of approximately six weeks.

Costs for the two year period were as follows:

COST OF TESTING LABORATORY

Purchase cost of machine	$438.15
Purchase cost of necessary screens and frames	89.27
Freight	5.33
Cartage to laboratory	5.00
Installation costs, 1936—$43.76	47.26
Purchase of scale (large)	10.00
Purchase of scale (small)	14.00
Benches, chairs, desk, file cases	20.00
Books, test forms, stationery	10.00
Sample bags, $28.28 and $9.09	37.37
Weighing box	8.00
Construction of permanent laboratory	292.47
Set of nesting screens for hand testing (already owned)	0.00
Total	$976.85

OVERHEAD COSTS

	1936	1937	
Assistant's salary	$225.00	$150.00	$375.00
Assistant's auto allowance	110.45	79.35	189.80
Labor at quarry weighing		8.00	8.00
Truck at quarry weighing		32.00	32.00
Welding screen		1.00	1.00
Operating cost of electricity	1.50	1.50	3.00
Transporting samples	85.00	40.00	125.00
Miscellaneous	2.00		2.00
	$423.95	$311.85	$735.80

OPERATING COSTS

Total Cost	$1,712.65
Number of tests run	602
Average cost per test	$2.84

ESTIMATED COST OF COMMERCIAL TESTING WOULD HAVE BEEN

Sample Bags	$ 37.37
Weighing Box	8.00
Labor Quarry Weighing	8.00
Truck Quarry Weighing	32.00
Transporting Samples	125.00
Miscellaneous	2.00
602 tests at $10.00 each	6,020.00
Total Cost	$6,232.37
Number of tests run	602.00
Average cost per test	$10.35

Thus it may be seen that the total cost to the company was $1,712.65 as compared to an estimated commercial testing cost of $6,232.37, or a saving of $4,519.72 in a two-year period. Indirect costs of personally sampling by the writer were not included since those costs would be the same no matter where the stone was tested.

(To be continued)

A Clinic On Operating Problems

Information on sand pumping and more data on wire rope are included in this month's clinic

Pumping Sand

QUESTION: A producer wants to know where to go to get expert advice on pumping sand.

ANSWER: The manufacturers of dredge pumps used for handling commercial sand and gravel have a great deal of data which has never been published. The data in standard handbooks are not very helpful. Most of their data on hydraulics are for water only and do not apply to mixtures of water and sand and gravel. Moreover, no two mixtures of sand and gravel and silt are ever just alike. The best source of text book information is U. S. Bureau of Mines Information Circular 6826, "Sand and Gravel Excavation, Part 3," by J. R. Thoenen.

Every dredge pump operator, if he would obtain the greatest possible efficiency, should study his installation after it is operating, with the help of a pumping expert. Pumping long distances is expensive in power, and a difference of a small percentage in the solids carried sometimes makes the difference between profit and loss.

To assist in serving our readers we asked one experienced sand pumper some pertinent questions: What type of pipe used? Straight welded steel was the answer. Was there an advantage in a larger discharge line? Yes, with an 8-in. suction pump a 10-in. discharge pipe line was used. The operator estimated the use of the 10-in. pipe cut down friction losses equivalent to a saving of one-third his power.

The operator emphasized the losses in sharp bends. This is much more serious when pumping sand, or sand and gravel, than it is in pumping water. In the case of a right-angle bend a good part of the sand and gravel carried by the water comes to a stop and has to be picked up again and its movement built up to the velocity of the water before it is efficiently transported in the pipe line. This operator estimated a right-angle bend equivalent in friction loss to 100 ft. of added pipe line. When absolutely necessary he uses two 45-deg. bends, never a full 90-deg. one.

Efficient transportation of the material in the pipe line means that it moves approximately at the same velocity as that of the water. In this instance, in pumping sand, it was found that whenever the velocity of the water in the line was reduced below 8 ft. per sec. a booster pump was needed to lift it up again. With gravel the limiting velocity would be somewhat more. We knew of one successful pump operator (and there are probably lots of them) who could tell when the pump was working efficiently by the sound in the pipe line.

It is desirable to have a larger motor than the theoretical horsepower required. Friction head, or velocity losses for sand and gravel vary and are not accurately determinable. As the pump wears, its efficiency is decreased, which is another way of saying it takes more power to pump the same quantity of materials.

Pumping operations probably require constant application of real engineering knowledge. They look like simple operations, and probably can be made so where conditions fit, if proper and constant attention is paid to details.

Reasons For Short Life of Wire

THERE ARE TWO REASONS why the wire rope draglines on these small machines give such limited service; the first and more important is the design of the equipment; the second is the character of the service.

When selecting a wire rope for any specified service one should be chosen which possesses: sufficient strength to take care of the maximum load which will be imposed with a proper factor of safety, ability to withstand the repeated bending without early failure of the wires from fatigue, ability to withstand the abrasive wear to which it will be subjected, and the ability to resist the types of abuse such as distortion and crushing from overwinding.

These small dragline machines are equipped with powerful motors, and if slack is allowed to accumulate before the power is applied, it is possible to break the wire rope. This also occurs when the drag bucket brings up short against some obstacle. This necessitates the use of the strongest grade, namely, improved plow steel wire rope.

Requirements for flexibility and ability to withstand abrasive wear are direct opposites. Flexibility in a wire rope is obtained by the use of many small wires, while large wires are necessary to resist wear. Here both requirements are present. The drums and sheaves are small in order that the machines may be as compact as possible. To meet this condition a flexible rope should be used. On the other hand the rope drags over the material it is handling, as well as other obstacles, and to resist the resulting wear, a stiff construction is the proper choice. A flexible wire rope would soon wear out from dragging, while a stiff one would quickly break up from fatigue when wound around these small sheaves and drums.

Thus it becomes necessary to compromise when selecting a wire rope for this service, and a compromise means reduced useful rope life. It has been found that a 6-strand rope with 10 outer wires to the strand gives, in general, as good service as any construction. This is a rugged rope well able to withstand moderate crushing and distortion.

A Lang Lay wire rope has greater wear resisting ability than the more common Regular Lay. Preforming is desirable as it increases the flexibility of the rope, causes it to wind more readily on the drums, and prevents broken wire ends from protruding from the rope. A wire center in place of the usual hemp center increases the resistance of the rope to abuse, especially that caused by overwinding, and adds to breaking strength.

These features add up to: a ⅞-in. diameter, 6x21, Lang Lay, Wire Center, Preformed, Improved Plow Steel Dragline Rope.

Left to right—(1) C. C. Loomis, Bernard L. McNulty. (2) C. B. Gager and his nephew, J. M. Gager, Jr. (3) W. H. Moores and J. H. Robinson. (4) Jack Dunaway and Fred Witmer. (5) H. R. Staley, James A. Murray, Stanton Walker. (6) A. T. Goldbeck, Bolton Corson. (7) L. Tschirky, J. H. Robinson. (8) H. L. Hammond, new chairman of the board

Would Promote Use of Lime In Concrete

Research men at annual convention of National Lime Association point out ways to create larger market for lime

By NATHAN C. ROCKWOOD

PROFITING by discoveries in research on mortars at the Massachusetts Institute of Technology, the National Lime Association extended its laboratory work there to develop new facts on the use of lime in concrete. As a result, the lime industry appears quite confident that lime as an admixture with cement for concrete will provide one of the largest outlets. Reasoning that this was the most interesting story to tell the lime industry and this was the field requiring the most immediate promotion, the management of the National Lime Association devoted practically all of its attention at the 21st annual convention, Hot Springs, Va., June 1 and 2, to a report on research, and discussion, on the effects of lime in mortars and concrete.

Industry's Problem

President S. WALTER STAUFFER explained the program to the convention by emphasizing the meaning and importance of this M. I. T. research. He said the problem was to get the results to the user of lime; there was a lack of follow-up; that either the association must spend a large sum to do this or the individual members must do a better promotional job of their own.

IRVING WARNER, vice-president, Warner Co., Philadelphia, Penn., was then introduced as the presiding officer and after a few preliminary remarks he presented the first speaker.

Masonry Wall Design

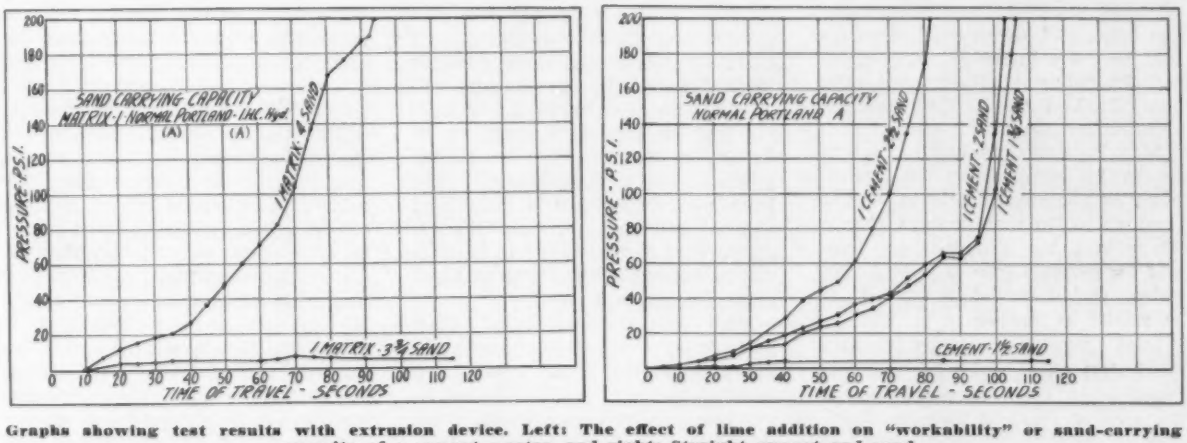
HOWARD R. STALEY, Massachusetts Institute of Technology, under the title "Volume Changes in Mortars and Strength Characteristics of Brick Masonry," reviewed and brought up to date the research work done under a fellowship of the National Lime Association in the building materials laboratory of M. I. T. Most of Prof. Staley's paper has been published before in various forms, for this work has been under way for several years and has already been a very important factor in re-establishing the use of lime mortars, or cement mortars in which considerable percentages of lime are used.

Research has continued in order to develop a logical basis for the design of masonry walls; for, as Prof. Staley said, the tendency has long been to design masonry assemblies along the lines of design for concrete. This practice puts undue emphasis on *strength* of mortars, whereas, it is the strength of the assembly that really counts. Bond between masonry unit and mortar is therefore more important than strength of the mortar alone; and bond is closely related to volume change during the hardening period. In this regard high limed mortars are said to exceed competitive materials. Prof. Staley said that lime-cement mortars have adequate strength for a wall designed for 250 lb. per sq. in. compressive stress.

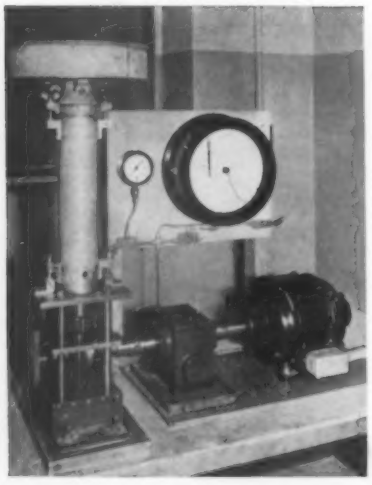
Bureau of Standards Expert

D. E. PARSONS, chief, masonry construction section, National Bureau of Standards, Washington, D. C., discussed the causes of leakage in masonry walls, as determined by the Bureau's own tests. He said that leakage occurs through openings between mortar and brick, or through voids in the mortar; rarely does moisture come through a brick. He emphasized the necessity of well-filled joints and recommended wetting bricks before they are laid.

Mr. Parsons said the percentage of lime in mortars was not a deter-



Graphs showing test results with extrusion device. Left: The effect of lime addition on "workability" or sand-carrying capacity of a cement mortar, and right: Straight cement and sand



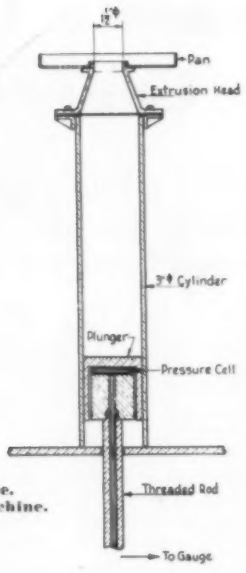


Fig. 1 (left): Motor-driven extrusion energy machine.
Fig. 2 (right): Cross-section through extrusion machine.

mining factor in permeability, but that workability and water-retaining capacity do have an important effect on permeability. Hence, cement and sand alone are very seldom satisfactory; but he had found that the *kind* of lime used was more important than the percentage of lime. Bond, he said, was a mechanical property of mortars rather than chemical. His conclusions on this were (1) fill joints; (2) wet the brick; (3) use mortar with water retaining capacity; (4) for strong masonry use strong mortars.

Volume change in mortars, Mr. Parsons said, depends more on water retaining ability than on lime as such, lime being water retaining. The rate of change in water retention is important. As to strength of masonry walls and Prof. Staley's theory of design, Mr. Parsons said the M. I. T. tests were confirmed by many investigations. There is no direct relationship between strength of brick assemblies and strength of the brick and strength of the mortar; they are important factors, but not the only ones. He did not agree that Prof. Staley's formula gave conservative working stresses.

Mr. Parsons concluded his remarks by emphasizing the importance of applying the results of this research to the manufacture of lime. There is a big difference in limes, and for mortars lime acts as a plasticizer, and it should be made to be as plastic as possible.

HARRY C. PLUMMER, chief engineer, Structural Clay Products Institute, Washington, D. C., spoke of the importance of research and the necessity of presenting research data so as to convince an engineer, and in a form that can be used. As an example he referred to a pamphlet he had prepared on cement-lime mortars, in which three different and specific mixes were recommended, each for a specific purpose. Mr. Plummer did not consider volume change in mortars so important as workability and water retaining capacity. Workmanship is more important than either strength of brick or strength of mortar, except for reinforced brick masonry, required in California cities. For large housing projects high-limed mortars have a distinct advantage in lower costs, he pointed out.

Practical Building Expert

C. C. CONNOR, assistant engineer, New Jersey Bell Telephone Co., Newark, N. Y., spoke as a building expert who had had much experience in trying to build leak-proof masonry walls. He commended Prof. Staley's paper as giving much helpful information and for the consistent attempt to relate laboratory research to field conditions. He thought volume change after hardening of mortar had an important influence on durability. However, it was not the sole criterion; workability and a good bond were important; a good bond was not destroyed by volume change; moreover, volume change in practice was probably nowhere near as much as in laboratory tests.

Mr. Connor commended Prof. Staley's tests on masonry assemblies but was doubtful of his conclusions; more data were needed before he could accept his formula. Mr. Connor said that all experience indicates the value of high limed mortars, but he did not disparage other mortars which also had good qualities. He thought compressive strengths were over-rated. There is no good reason for designing brick masonry as we do concrete or steel. Water-tight walls are usually more important to the builder than excessively strong ones.

The problem of water-tight brick walls, Mr. Connor said, looks to be near solution, but experience has proved that not all lime mortars gave water-tight walls; there was cracking with 30 percent of other mortars and with 10 percent of lime mortars. Mr. Connors did not favor wetting the brick; he said brick with the proper rate of absorption should be used. He had found no frost action on lime mortars and he had found consistently higher strengths with dolomitic limes.

Lime in Concrete

C. C. LOOMIS, president, New England Lime Co., North Adams, Mass., presided at the second session, which was devoted entirely to a discussion on "Effects of Lime in Mortar and Concrete," led by PROF. WALTER C. Voss, Massachusetts Institute of Technology. His discussion was divided into two parts, (1) sand carrying capacities of mortar matrices; (2) effects of lime on concrete. It centered around an "extrusion energy machine" he has designed and built and used in his tests (Figs. 1 and 2). This he believes gives an accurate measure of the sand-carrying capacity of a cementing material, and hence is a measure also of its workability. Workability includes prevention of segregation and is, according to Prof. Voss, fully as important in using concrete as strength. Adding lime to concrete mixes gives them greater sand-carrying capacity and more workability. If it can be proved that this is done without decreasing the strength of the concrete, there is every argument for using lime, he argued.

Extrusion Machine

The testing device, already referred to as an extrusion energy machine, measures the pressure developed in pushing a mortar mixture out of a 3-in. cylinder, by a piston traveling 6 in. per minute, through a restricted opening at the top. The maximum pressure attainable is 300 lb. per sq. in., or a total load of about one ton. A workable mix, as defined by Prof. Voss, will extrude completely without excessive packing during the entire travel of the piston, covering about 2 minutes. If

the mix is unworkable the pressure will rise very rapidly from its uniform travel value to 300 lb. per sq. in. in a few seconds.

Prof. Voss believes his machine will successfully measure: (*a*) aggregate carrying capacity of the matrix; (*b*) effect of the gradation of aggregate on (*a*); (*c*) effects of admixtures on (*a*); (*d*) water-retaining capacity of matrix, and (*e*) thyxotropic characteristics of the matrix. The graphs (page 41) illustrate the kind of data developed by tests on this machine. His general conclusions to date, on the basis of the materials used in his tests are: (1) portland cements tested will not safely carry more than 2 parts of a graded silicious sand of a fineness modulus of 2.00; (2) the masonry cement will not carry more than 2½ parts of the same sand; (3) the high calcium lime hydrate not more than 2¼ parts; (4) the dolomitic lime hydrate not more than 2¾ parts; the high calcium lime putty (water proofed) will carry 3¾ parts of the same sand.

Considering concrete in the light of a conglomerate cementation of irregular stones, the mixture of cement and sand becomes merely a masonry mortar. The use of lime permits more aggregates without injuring the strengths of the concrete, according to Prof. Voss. However, when lime is used the slump test is no longer helpful as a guide to strength.

In conclusion Prof. Voss said in part: (1) 400 lb. of total cementitious materials per cu. yd. of concrete is too low safely to produce 3000-lb. concrete, but is satisfactory for 2500-lb. concrete; (2) more than 450 lb. of cementitious materials is too conservative unless strengths of over 3500 p.s.i. are desired; (3) replacements of cement in concrete mixes containing 400 to 450 lb. of cementitious materials per cubic yard by lime, equal to 10 percent of the weight of the cement, will increase the strength of the concrete, while replacements equal to 15 percent will not reduce the strength of the concrete; (4) the normal portland cements on the market are affected similarly by lime; (5) strengths at early ages (7 da.-28-da.-3 mo.) are a function of the water-cement ratio, using the net amount of cement in the mix, regardless of the amount of lime used; (6) curing is just as essential for concrete containing lime as it is for straight portland cement concretes; (7) lime does retain water from the mix and prevents bleeding inasmuch as slumps were the same, flows were less where lime was used than in straight cement concrete;

Fig. 3(a): Unworkable mortar during extrusion

Fig. 3(b): Workable mortar during extrusion

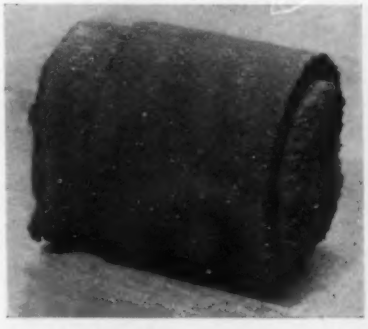


Fig. 3(c): Packed material after refusal to extrude

(8) lime produced a more cohesive mix; (9) inasmuch as the early strengths of concrete are definitely related to the water-cement ratio, and inasmuch as the replacement of cement with lime up to 50 lb. per cubic yard of concrete gave higher strengths than straight cement concrete, the use of lime reduced the water-cement ratio for the same slump. Prof. Voss admitted that many more corroborative tests should be made to insure positive conclusions.

Highway Expert

A. T. Goldbeck, engineering director, National Crushed Stone Association, former chief of the testing division of the U. S. Bureau of Public Roads, reviewed the history of the use of lime in concrete. He recalled that some tests gave favorable and some unfavorable results for lime. He reminded his listeners that the sand-carrying capacity of the cements tested was based entirely on results with the extrusion machine; he did think it gave some measure of the workability of the mix; the results with high sand ratios were not necessarily related to actual practice where mortars were not subjected to such high pressures. That different cements had different sand-carrying capacities checked with experience, he said. Mr. Goldbeck said the extrusion machine should prove valuable, but warned against drawing too sweeping conclusions as a result of these tests.

Prof. Voss' paper, Mr. Goldbeck reminded, was on the effect of lime on compressive strengths of concrete only. He said Prof. Voss' curves of strength increase do not agree with results of other investigators. There are some exceptions to the water-cement ratio law when unworkable mixes are approached. Prof. Voss worked mostly with lean mixes. The relative costs of lime and cement did not necessarily point to the use of lime for workability, Mr. Goldbeck said. On the use of lime in concrete submerged in water he suggested a new idea—that since lime is continuously dissolved, additional lime as an admixture might prolong the life of the concrete. In conclusion, Mr. Goldbeck paid a nice compliment to the association for its research activities.

Concrete Expert

Stanton Walker, director, engineering and research division, National Sand and Gravel Association, former co-worker with Duff Abrams in the concrete laboratory of the Portland Cement Association, referred back to his own experience. He said the attitude at the time of the advocates of lime was that there was something wrong with cement which lime would cure. Reviewing the literature on the subject he found different conclusions from honest investigators. Part of this difficulty undoubtedly arose from the fact that there had been no measure of workability; and differences in cements probably accounted for some of the differences in conclusions. Also there was difficulty making comparable mixes. He commended Prof. Voss' extrusion machine and its highly interesting results.

Mr. Walker's own ideas about admixtures in concrete were: (1) chemically active; (2) inert. Hydrated lime he classified as inert. He said we should not look for in-

creases in strength from inert admixtures, because they could not help except by supplying needed particle size fractions, which he thought could be accomplished more economically in other ways. He admitted that lime aided workability. He said modern portland cements are approaching a more uniformly sized product. In conclusion, Mr. Walker said we should not conclude from Prof. Voss' tests that the addition of lime to richer concrete mixes would give the same results; the mixes tested were comparatively lean or harsh ones.

CHARLES WARNER, president, Warner Co., Philadelphia, Penn., at this point referred to the Duff Abrams' tests of several years ago. He said Mr. Abrams overlooked the fact that up to a certain point additions of lime reduced the water-cement ratio. To this Mr. Walker replied that Mr. Warner was right; that in all the Duff Abrams' experiments lime was added to the cement, and not cement replaced with lime. Adding lime, of course, increased the water-cement ratio by the amount of water required for the lime.

Noted Author

SANFORD E. THOMPSON, president, Thompson and Lichtner Co., Boston, Mass., and co-author of the first American textbook on concrete, commended research in general as the source of progress. He said that much of the early work on the effects of lime in concrete was unscientific as viewed by present lights because there were so many variables. In developing a market for the use of lime in concrete, Mr. Thompson said to remember that cost and durability were often more important than strength. Workability of concrete was undoubtedly improved by the use of lime. He said sand particle size and gradation were very important, that the void test alone was not conclusive. Possibly the use of lime improved the effects of sand grading.

Officers Elected

The following officers were elected: K. L. Hammond, chairman, Board of Directors, Keystone Lime Works, Inc., Keystone, Ala.; S. Walter Stauffer, president and general manager, National Lime Association, Washington, D. C.; W. Vernon Brumbaugh, secretary and assistant treasurer; James H. McNamara, treasurer, Eagle Rock Lime Co., Eagle Rock, Va.; Roma F. Medford, assistant secretary.

The executive committee is comprised of K. L. Hammond, chairman, Henry LaLiberte, president, Cutler-Magner Co., Duluth, Minn.; Fred Witmer, president, Ohio Hydrate & Supply Co., Woodville, Ohio; B. L. McNulty, president, Marblehead Lime Co., Chicago, Ill.; Reed C. Bye, American Lime & Stone Co., Philadelphia, Penn. Directors are:

DISTRICT 1: C. C. Loomis, president, New England Lime Co., Adams, Mass. DISTRICT 2: H. D. Brigstocke, vice-president, Thomasville Stone & Lime Co., Thomasville, Penn. DISTRICT 3: Reed C. Bye, American Lime & Stone Co., Philadelphia, Penn. DISTRICT 4: S. C. Snead, secretary-treasurer, Kimbalton Lime Co., Inc., Shawsville, Va. DISTRICT 5-A: G. J. Whelan, president, The Kelley Island Lime & Transport Co., Cleveland, Ohio. DISTRICT 5-B: Russell Rarey, vice-president, The Marble Cliff Quarries Co., Columbus, Ohio. DISTRICT 6: Gordon W. Hughes, sales manager, Inland Lime & Stone Co., Manistique, Mich. DISTRICT 7: Bernard L. McNulty, president, Marblehead Lime Co., Chicago, Ill. DISTRICT 8: Mrs. M. K. Lounsbury, Allwood Lime Co., Manitowoc, Wis. DISTRICT 9: Henry LaLiberte, president, Cutler-Magner Co., Duluth, Minn. DISTRICTS 10-11: K. L. Hammond, secretary-treasurer, Keystone Lime Works, Inc., Keystone, Ala. DISTRICT 12: Paul Sunderland, general superintendent, Ash Grove Lime & Portland Cement Co., Galloway, Mo. DISTRICT 13: Cecil R. Haden, secretary, The Haden Lime Co., Houston, Tex. DISTRICT 14: Paul H. McMillin, president, Roche Harbor Lime & Cement Co., Roche Harbor, Wash. DISTRICT 15: No election.

Most Modern Gas-Fired Lime Kilns

GYPSUM LIME AND ALABASTINE, CANADA, LTD., placed in operation at Beachville, Ont., 100 miles west of Toronto, the week of May 21, the most modern gas-fired lime kilns in North America. The editor says that advisedly after an inspection of the plant on May 26, when the company held open house to invited guests.

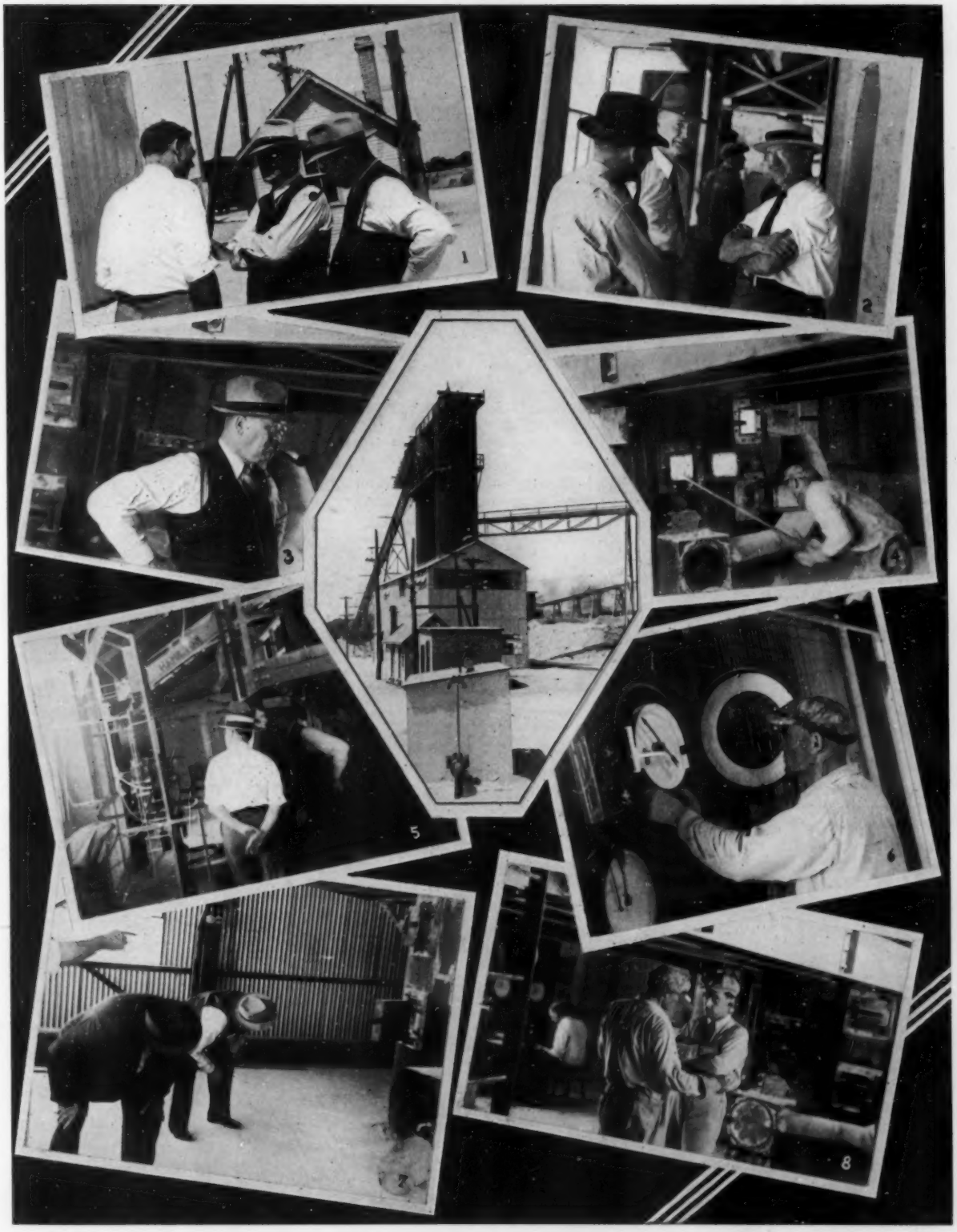
The reason we believe this to be the most modern shaft-kiln lime plant is that labor costs have been reduced to a minimum comparable with a rotary kiln plant of the same capacity—3 men per shift for the two kilns—which have a capacity of 70 to 75 tons of high calcium lime per 24 hours, each, or 140 to 150 tons, together, which is about the daily capacity of the average rotary lime kiln. The kilns are drawn every 1½ to 2 hours and produce approximately 1 ton of lime per square foot of kiln cross-section per day. The kilns are approximately 7 x 10 ft. inside dimension by 72 ft. high. The top 16 ft. is a stone storage hopper and bottom 16 ft. a lime cooling chamber.

The plant was designed by Victor J. Azbe, consulting engineer, St. Louis, Mo., and erected by the company's own force, under the supervision of J. H. Robinson, general superintendent; T. F. Robinson, superintendent, and R. S. Adams, superintendent of construction. The design includes many of Mr. Azbe's latest developments, such as the center burner, CO_2 injector, which supplies hot, concentrated CO_2 from the top of the burning zone for diluting the natural gas fuel, and for heat recovery. Gas is delivered to kilns at about 30 lb. per sq. in. pressure, which supplies the vacuum for operating the injector. A complete description of these kilns and their operation will appear in Mr. Azbe's Lime Forum Section of ROCK PRODUCTS at a later date.

Another reason which makes us say this is the most modern lime plant is the fact that the gas can be turned off on Saturday at 5 p. m. and the plant shut down until 7 a. m. Monday morning. When the gas is turned on again there is more than enough heat retained in the lime to fire the gas, and production begins where it left off. The kilns, of course, are well insulated.

The natural gas comes from a field about 17 miles distant and about 500,000 cu. ft. daily are required for the two kilns, which replace a battery of 12 coal-fired kilns producing less lime than the two new ones.

Attending the formal opening and inspection of the plant on May 26, in addition to those already mentioned were George Dobbie, president of the company; H. H. Phillips, general sales manager; F. Andrews, secretary-treasurer; D. C. Nickle, industrial sales manager; J. H. Robinson, Sr., and W. S. McAllister, Standard Lime Co., Ltd., Joliette, Que., a wholly owned subsidiary of Gypsum, Lime and Alabastine, Canada, Ltd.; W. P. Gamble, Winnipeg Fuel & Supply Co., Winnipeg, Man.; Flack B. McColl, Frontenac Oil Co.; Messrs. Henderson, Steel Co. of Canada; Waterman, Toronto Brick Co.; Loney and Gard, Canadian Industries, Ltd.



Center: New Beachville, Ont., lime plant of Gypsum, Lime and Alabastine, Ltd., and views of its inspection on May 26: (1) Left to right, J. H. Robinson, general superintendent; George Dobbie, president, Gypsum Lime and Alabastine; W. S. McAllister, Standard Lime Co., confer. (2) Center, R. S. Adams and D. C. Nickle. (3) W. S. McAllister. (4) Foreman pokes down kiln. (5) Interest in the instrument panel. (6) Changing charts. (7) See how nice the lime looks! (8) Victor J. Azbe, left, consults with plant foreman

More Research In Sand

National Industrial Sand Association convention outlines research activities, and discusses national and state legislation

By BROR NORDBERG

SOUTHERN New Jersey producers of industrial sands were hosts to the fourth annual convention of the National Industrial Sand Association on May 25 and 26 at the Ambassador hotel, Atlantic City. The board of directors met on the day preceding the convention to consider Association affairs and matters to be taken up in the convention proper.

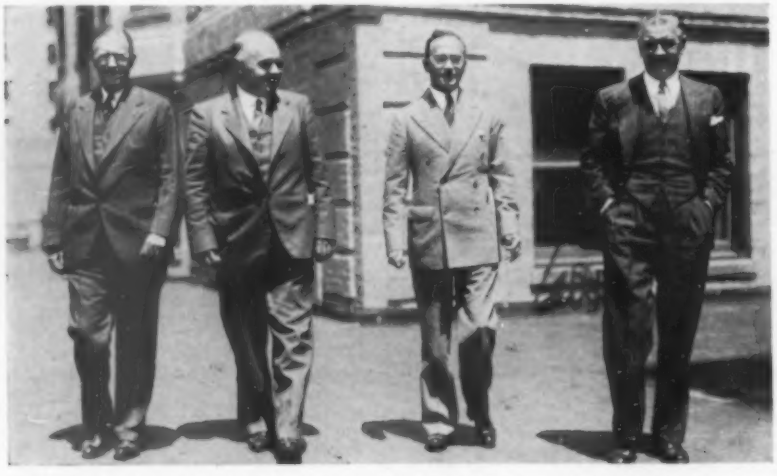
Russell G. Hay, Ayers Mineral Co., Zanesville, Ohio, was reëlected president by unanimous vote. L. M. Hansen, Chicago, Ill., and Ralph T. Stevens, Cape May, N. J., were likewise unanimously reëlected vice-president and treasurer, respectively. Members of the board of directors, in addition to the officers are E. J. Beyer, Rockwood, Mich.; P. S. McDougall, Ottawa, Ill.; Mark T. McKee, Detroit, Mich.; A. J. Miller, New York, N. Y.; J. M. Strouss, Morgantown, W. Va.; W. J. Woods, Lewistown, Penn.; and past-president A. Warsaw, Chicago, Ill.

President Russell Hay expressed his appreciation of the attendance and complimented the work which the Association had done and is continuing to do for the industry. Worthwhile projects mentioned included the work done by the Association in 1938 in the freight rate case, the participation of an association committee in formulating the Foundry Code of New York State, the activities of the research committee at a recent meeting of the American Foundry Men's Association to eliminate some tolerances which were specified on sand grading, and the consistent aid of the Washington office in interpreting laws directly affecting the industry. He suggested that further research would be warranted in the light of future benefits in dealing with other sand classifications, such as the New York ceramic industries code which will soon be written.

Stanton Walker, consulting engineer of the Association, and chairman of the committee on foundry sands, reported for the committee on research in the absence of E. O. Schneider, chairman.

Research Activities

The research committee includes in its membership six representatives selected as to their interest in particular sands and markets: namely, blasting sands, glass sand, unbonded and bonded foundry sands, grinding sand, and miscellaneous sands.



On parade at Atlantic City. Left to right: Russell G. Hay, Ralph T. Stevens, A. Warsaw, and L. M. Hansen

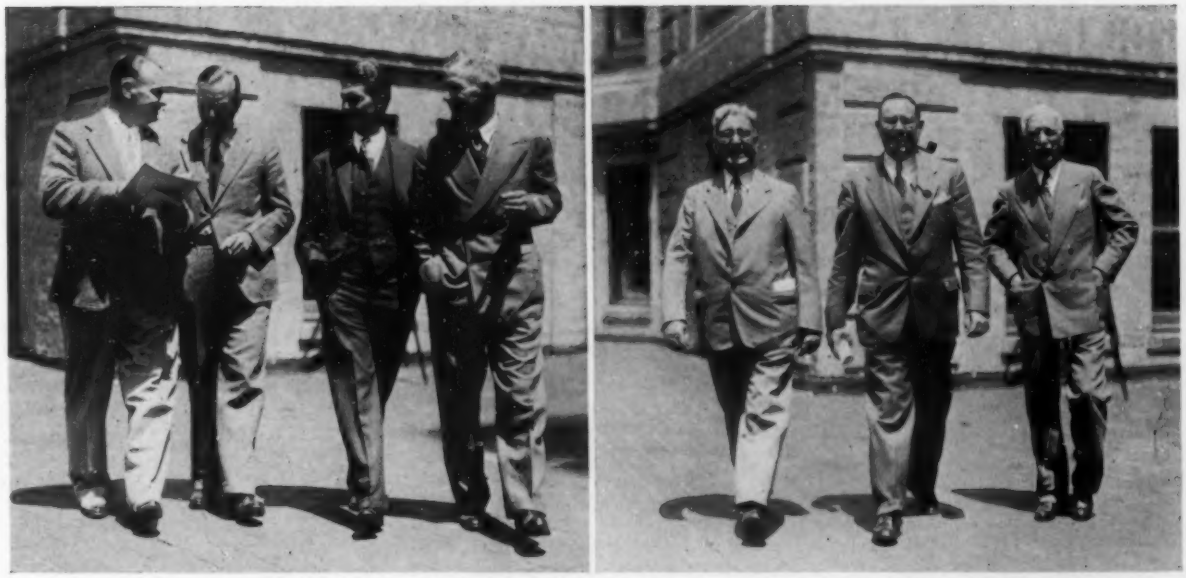
Information has been developed by the committee on foundry sands to be used in coöperation with the committee of the American Foundrymen's Association in working out specifications which will simplify production problems. Mr. Walker's committee has made studies of methods of sampling unbonded sands, grading and tolerances on any given sieve, and consumers' purchase forms which outline desirable properties with suggested tolerances. These studies were instigated because of the variations in foundrymen's purchase forms, differences in tolerances retained on any given testing sieve when tested by laboratories, and the wide variations in results arrived at by different laboratories when testing identical samples but taken by different sampling methods.

Mr. Walker suggested that differences in sieves, the condition of testing sieves, etc., made a tolerance of plus or minus 20 percent retained on a specific sieve unreasonable to fill, and backed it with information developed by his committee. Twelve 100-gram identical samples tested by the committee showed variations far exceeding 20 percent plus or minus on a particular sieve, when taken from the same source, using six different methods of sampling. As a result of these findings, several members attended the recent Cincinnati A.F.A. convention and presented the data before the A.F.A. research committee, with favorable results.

Occupational Disease Legislation

Theodore C. Waters, Baltimore, Md., counsel for the Association, presented a paper, "Trend of State Legislation in the Occupational Disease Field."

Mr. Waters pointed out that in 1938 bills on occupational diseases were introduced in all of the industrial states. The majority of the bills have attempted to liberalize and increase benefits under the laws extending the type of coverage for



Some of the smiling countenances at the Industrial Sand meeting. Right: Wilbert Bivens, Floyd M. Wheat, and E. M. Ayers. Left: Looks like they are giving "Stanton" "the works"; M. R. Taggert, Stanton Walker, Geo. A. Thornton, and E. J. Beyer

which compensation will be payable, and increasing monetary benefits to the injured employes.

In the 1939 session of the New York legislature, three bills were introduced having as their purpose the increase of compensation for silicosis injuries, all of which were killed, and the $3000 limitation of liability was retained. Another bill has been introduced to increase the medical benefits for dust diseases and will likely be passed. It provides for an amendment which will give the Workmen's Compensation Board the right to increase the period for required medical treatment by the employer not to exceed 180 days. At present 90 days added medical treatment is provided for as a possible extension to a required 90 days compulsory medical treatment for injury caused by dust disease.

In the Pennsylvania legislature there is now pending a bill to amend the occupational disease law as passed in 1937, which retains all of the provisions of importance to industry including the following: (1) Denial of compensation for partial disability; (2) Limitation of an employers' liability to the amount of $3600; (3) Provisions relating to the medical board have been extended to make its findings of fact upon medical questions final.

Mr. Waters believes that in the near future there will be attempts to amend or broaden the scope of the West Virginia Silicosis Law, even though the legislature did adjourn its session without any change. An attempt is likely to be made to increase benefits and to extend the law to diseases other than silicosis.

New York State codes were discussed to considerable extent. Two codes of importance have been under study during the last year: (1) the stone cutting and finishing code and (2) the foundry code. In the former, the definitions of injurious dust are of particular interest, there being three definitions. For stone containing less than 10 percent free silica, the permissible concentration is 100,000,000 particles of dust per cu. ft. of air. In the range from 10 percent to 70 percent SiO_2, 10,000,000 particles is the permissible limit and for more than 70 percent SiO_2 5,000,000 particles is the maximum allowed.

The Foundry code differs considerably in its definition of injurious dusts and fixes 25,000,000 particles per cu. ft. of air as the top limit for safety irrespective of free silica contained. This figure holds for all foundry operations except abrasive blast cleaning, when the concentration shall not exceed 10,000,000 particles.

Mr. Waters discussed several court decisions on specific representative cases.

Senate Bill No. 2256 was introduced in Congress on April 27, 1939, which is an attempt by the federal Department of Labor to extend its jurisdiction with the object of compensating employes for disability and death from silicosis or other dust diseases. The basic purpose of the bill is covered in the following first section in part:

"That (a) for the purpose of enabling each state (1) to provide more adequate protection to workers and their families from economic losses caused by disability or death resulting from dust diseases, and (2) to promote the prevention and control of industrial health hazards causing dust diseases, there is hereby authorized to be appropriated for each fiscal year, beginning with the fiscal year ending June 30, 1940, a sum sufficient for making the payments hereinafter provided for to States which have submitted and had approved by the Secretary of Labor, State compensation plans and prevention plans."

The Bill provides that a state compensation plan shall not be approved by the Secretary of Labor except upon these conditions:

(1) That the plan provide for compulsory workmen's compensation coverage by insurance methods deemed by the Secretary of Labor to be satisfactory.

(2) That it provide for the payment of compensation for silicosis injuries equal to compensation for accidental injuries.

(3) That it prohibit waiver of disability benefits by workers.

(4) That it provide procedural safeguards to insure prompt payment of benefits.

(5) That it provide for compulsory reporting by employers of all dust diseases.

(6) That it prohibit discrimination with respect to hire or tenure of employment by employers against any person on the ground of his previous exposure to dust disease hazards.

(7) That it provide for State expenditures adequate to insure the efficient administration of the State law.

Mr. Waters concluded by saying that members should carefully watch the coming legislative sessions.

Political Scene in Washington

Another important and interesting talk was that of V. P. Ahearn, executive secretary, on "The Political Scene in Washington." Mr. Ahearn clarified the provisions of statutes of direct and indirect interest to the

(Continued on page 68)

HINTS AND HELPS for Superintendents

Protecting Belt At The Loading Hopper

AT THE GRAVEL PIT of the Janesville Sand and Gravel Co., Janesville, Wis., some trouble was caused

Build roof over belt to protect it from large stone falling from hopper

by material falling from shovel bucket onto the conveyor belt instead of into the feeder hopper. Also when the hopper was full, the larger stones occasionally fell over the sides, resulting in considerable damage to the belt and idlers below. To eliminate this trouble, a framework with a pointed roof was built over the belt directly beside the hopper. For convenience the frame was spiked directly to the conveyor framework. The roof was about 6 ft. long, and wide enough to amply cover the belt. To protect the peak from being broken by falling stones, a sheet metal strip about 18 in. wide was bent over it and then nailed down on each side.

Handling Bulk Cement In Large Bags

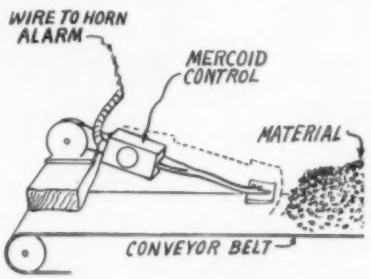
MONOLITH PORTLAND CEMENT CO., Los Angeles, Calif., has developed a unique method of handling bulk cement on truck-trailer units. This method, as shown in the illustration, involves the use of large canvas sacks which hold about 1600 lb. They are easily handled on the job by simply lifting off the bag by means of an overhead hoist and untying the rope which closes the bottom of the tubular bag. Michael Treshow and Carleton T. West, engineers of the company, designed the bag. Patents have been applied for the bag and the method of use to transport bulk materials.

Each bag consists of a heavy canvas tube nearly 3 ft. in diameter with the top gathered around an iron ring. As mentioned, the bottom is fastened by a rope which is tied around in such a manner as to close the bottom end. When loaded on a truck, a tarpaulin is used to cover the bags to protect them from inclement weather. On arrival at the job, the bags are unloaded by an overhead hoist which supports them over an unloading hopper. The pneumatic hoist has a hook which engages suitable rings attached to the circular iron ring at the top of the bag. After it has been moved over the unloading hopper, the rope at the bottom of the back is pulled, and the entire contents drop into the hopper.

It is anticipated that the life of the bags will permit them to be used for a sufficient number of times substantially to balance their cost. Another advantage is that the use of the bags will release truck equipment for other jobs since there will not be any necessity for excessive standing time. It will also be possible to deliver bulk cement directly by truck to any one of several points on a large job without the use of special transporting equipment between a common point of cement unloading and the locations of concrete mixers.

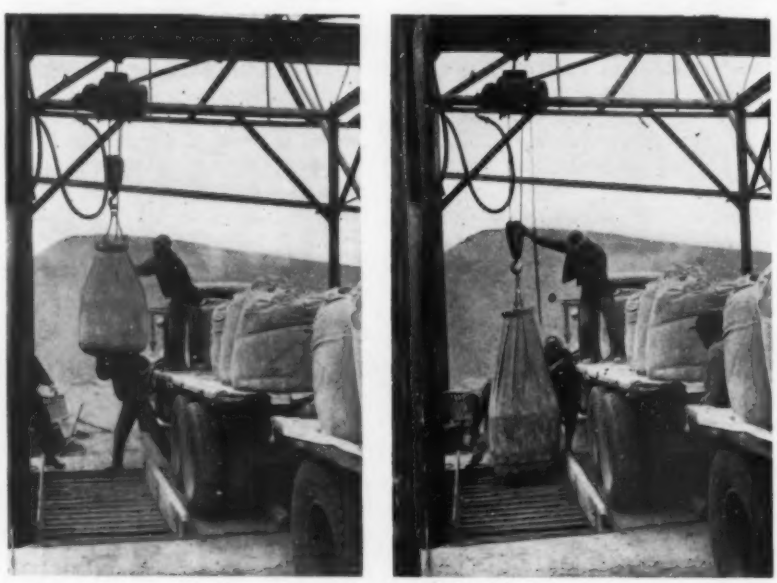
Alarm Sounded When Conveyor Feed Stops

AT A LARGE GOLD MINE in Canada, an alarm device is used which probably has a number of applications in



Electrical device which sounds horn alarm should there be a failure of material fed from the surge bins to conveyors leading to ball mills

the rock products industry. Conveyors which feed the three ball mills, respectively, from the surge bin are each provided with a device which operates a horn alarm in case the feed from the surge tank fails, such as may be experienced when a chute is blocked. The device, which is placed near the surge bin discharge chutes, comprises a Mercoid control,



Left: Moving bag of cement over hopper. Right: Unloading bag containing 1600 lb.

Detachable quarry buckets transfer their load through hoppers into kiln-charging-hoist-powered cars

No. 848-X, Range 122-195 deg. F., voltage 110 and 120, amperes 10 and 5. A steel arm with a rubber-padded end rests on the conveyor load with the Mercoid control (less the temperature parts) mounted on the arm and adjustable to any level. Should the flow of feed stop, the arm drops down and the mercury in the control flows down to make contact for the horn.

Quarry Skip Buckets

Dixie Lime Products Co., Ocala, Fla., in January this year, installed a new model 200 LF Dempster-Dumpster, carried on the chassis of a 95-hp. Ford V-8 truck, and three 2-cu. yd. buckets for handling lime rock from the quarry to the charging incline for the shaft kilns at Reddick, Fla. The skip buckets are hand-loaded as were the dump trucks which they replace.

A Bucyrus-Erie B-10 shovel with ⅝-cu. yd. bucket is used to load fines (below 3 or 4 in. size) into a dump truck which dumps this "waste" material over the worked out bank.

In disposing of the fines over the spoils pile segregation, the bugaboo of all aggregates producers is used to advantage in recovering some of the larger material necessarily picked up by the shovel. The larger particles roll to the outside of the pile on the quarry floor where they are readily loaded into quarry skips and picked up by the Dumpster. The fines not suitable for kiln feed are of course sold for road material.

The haulage units are of the newer type with the load carried well forward to distribute it more effectually on the chassis, and 30 to 40 trips are made daily in charging the kilns. An overhead track for charging the kilns is inclined downward at each end of the row of nine kilns with a receiving hopper for lime rock at each end of the track. The skips discharge into cars of 2-cu. yd. capacity.

Jacket for Gravel Sizing Screen

In the illustration is shown a jacket which has been added to an ordinary sizing screen so that the

Separating out finer sizes with jacket on rotary screen

finest material can be readily separated from the material of the next larger size. Such a jacket is particularly useful where all of the sizing is done by one large screen. It has a number of sections with different openings, as is the case on the screen shown.

Wood sections are bolted to the outer surface of the screen and to these the jacket surface is screwed. At the lower end, bolts or blocks are used to hold the jacket out, but not to impede the discharge of the rejects from the jacket of the sizing screen.

Eliminates Belt Tighteners By Slack Belts

Knoxville Sangravl Material Co., Knoxville, Tenn., has eliminated all forms of conveyor belt tighteners on long spans and loosened the belts to save cutting of conveyor belting. With taut belts there had been considerable premature cutting into the belt fabric from sharp-edged, crushed gravel particles "riding" between belting and pulleys.

One of the conveyor belts, 480 ft. in length, carries crushed gravel up an incline from a primary crushing plant to the screening plant; the other, 300 ft. in length, is used to stock aggregates over a reclaiming conveyor tunnel. On both of these belts, return idlers were spaced at 10 ft. intervals and the conventional weighted belt stiffeners were used. Most of the return idlers, and the belt tightener, have been removed and idlers have been left on 40-ft. centers.

The belt has sufficient length, in each case, to have a sag of 3 or 4 ft. between idlers, which is all that remains to keep the carrying side of the belt taut. The sag is just enough to serve this purpose, but has enough "give" to throw out gravel particles lodged under the rubber at pulley faces. It is claimed that this practice has materially increased the life of belting, which at this plant is limited by rot, rather than wear, due to weathering when the fabric is exposed by cutting.

Sagging of conveyor belt on extreme left and inclined belt on right lessens tension in belt and reduces cutting when sharp gravel lodges between pulleys and belt

NATIONAL ASSOCIATION ACTIVITIES

Sand and Gravel

EXECUTIVE SECRETARY V. P. AHEARN has secured from Administrator Walling of the Walsh-Healey Act a ruling that "marine workers on barges, such as barge captains or on dredges out of touch with the shore for periods in excess of 24 hours, will not be regarded as subject to the act," but that employes who go aboard the dredge daily from the shore and return at night to the shore are subject to its provisions, the time of such employes being deemed to commence at the period when they are required by the company to report for work.

With regard to truck drivers under this Act, Mr. Walling holds that where a producer signs a contract for delivery of materials to the government in which truck transportation is involved and in which the trucking is done by bona fide trucking contractors, the employes of that bona fide trucking contractor are not subject to the Act; but that owner-operators of trucks and drivers of trucks owned by the producing company would be subject to the Act.

Crushed Stone

ADMINISTRATIVE DIRECTOR J. R. Boyd of the National Crushed Stone Association, in a recent letter to the Association, comments on Interpretative Bulletin No. 13 issued by Administrator Andrews of the Federal Wage and Hour Law. This bulletin clarifies the meaning of "hours worked." Briefly, hours worked include all time during which an employe is required to be on duty or be on the employer's premises or to be at a prescribed work place, and all time during which an employe is suffered or permitted to work whether or not he is required to do so. It is pointed out that under certain circumstances the employer is given the right to consider that the employe is not at work within the meaning of the law if, notwithstanding that the employe is subject to work, he has a normal night's sleep, ample time in which to eat his meals and a certain amount of time for relaxation and entirely private pursuits. Interpretative Bulletin No. 13 seems to provide a solution for the problems which arise out of the employment of watchmen. Such employes more often than not are superannuated and have very minor duties to attend to in the plants at certain specific periods, but are always on call. Under this liberal interpretation of the law, it will not be necessary for companies to discharge superannuated employes because of an intolerable burden created by arbitrary application of the overtime penalty of the Law.

Mr. Boyd also commented on the recent ruling by Mr. Walling, administrator of the Public Contracts Act which stated that "where a contractor who has taken a contract subject to the provisions of the Public Contracts Act for the supply of sand and gravel has in stock at the time performance of the contract is to begin and at all times during the period that the contract is in effect stock adequate to supply the demands of the Government under the contract, it may be considered that these materials are in stock under the provision of Section 13, Subsection 9, of Rulings and Interpretations, even though the stock pile is added to at regular intervals to meet the demands of the commercial end of the contractor's business." The effect of Mr. Walling's ruling is to make the Act applicable under the provisions cited only to those employes who are used in the transfer of the material from the stock pile to the transportation facilities and not retroactively to the production employes. It is pointed out that the question is equally applicable to the crushed stone industry.

Coming Conventions

National Crushed Stone Association, directors' meeting, Westchester Country Club, Rye, N. Y., July 20.

National Safety Congress and Exposition, Atlantic City, N. J., October 16 to 20.

National Sand and Gravel Association will hold regional meeting of California producers July 25 at Palace Hotel, San Francisco, followed by Los Angeles meeting, July 31.

Lime

ANNOUNCEMENT has been made by Hal Covert, secretary-treasurer and general manager of the organization of the Southeastern Lime Institute, Inc., Knoxville, Tenn. The officers in addition to Mr. Covert are as follows: President, E. L. Osborne, Knoxville, Lime Manufacturing Co.; first vice-president, E. S. Ginnane, Cheney Lime & Cement Co.; second vice-president, S. C. Snead, Kimbalton Lime Co.; third vice-president, W. H. Palmer, Dixie Lime Products Co.

THE U. S. BUREAU OF MINES has announced the standing of the lime companies in the safety contest conducted under the auspices of the National Lime Association. Billmeyer plant, of the J. E. Baker Co., Lancaster county, Penn., won the certificate of honor in the group employing 50 or more men with a record of having operated 170,442 man-hours during 1938 without a disabling injury to an employe. In the group of plants employing less than 50 men, the honors went to the South Chicago plant of the Marblehead Lime Co., which operated 79,512 man-hours without a disabling injury. Certificates of honor also were awarded to the following six plants having accident-free records: McCoy plant, Bridgeport, Montgomery county, Penn., operated by the Warner Co., Philadelphia, Penn., with 73,230 man-hours; Quincy plant, Quincy, Adams county, Ill., operated by the Marblehead Lime Co., Chicago, Ill., with 68,398 man-hours; Oranda plant, Strasburg, Shenandoah county, Va., operated by National Gypsum Co., Buffalo, N. Y., with 59,970 man-hours; Newala plant, Newala, Shelby county, Ala., operated by the Newala Lime Works, in service 24,960 man-hours; Thornton plant, Thornton, Cook County, Ill., operated by the Marblehead Lime Co., with 24,960 man-hours. Companies in nineteen states were entered in the contest. The combined accident-frequency rate for all of the enrolled plants was 25.2 per million man-hours of exposure and the combined accident-severity rate was 4.3 days of disability per thousand man-hours.

NEW LITERATURE

About Your Business

The following literature, recently published, is available free, upon request:

Ball Mills.—Allis-Chalmers Mfg. Co. has issued a new 24-page bulletin, No. 1813-F, on ball mills. In addition to numerous shop and installation views of a variety of units, the bulletin goes into the details of their construction and gives types of drives and feeders used.

Buckets.—The Hayward Co. A new bulletin, "You Steer a Safe Course When Using Hayward Rehandling - Buckets," describes and illustrates Hayward class E-16 buckets of all sizes, suitable for rehandling both light and heavy materials.

Chains.—Moline Malleable Iron Co. A new illustrated catalog gives complete listings and new prices of Moline malleable and combination chains and chain attachments.

Compressors.—Pennsylvania Pump & Compressor Co. has issued a new single stage roller bearing compressor bulletin No. 184. Photographs of the various parts and cut-away drawings supplement the text in presenting these compressors.

Concentrating Tables.—Denver Equipment Co. Bulletin No. 38TI explains in detail the features and uses of the Wilfley concentrating tables. Of interest are flow sheets showing where Wilfley tables should be used.

Concrete Mixers.—T. L. Smith Co. has issued a circular about the Smith-Mobile truck mixer and agitator. The many illustrations show the adaptability of this mixer to numerous discharging problems.

Electric Tools.—Independent Pneumatic Tool Co. A 48-page catalog gives complete descriptions, specifications and prices on the entire Thor line of electric tools.

Explosives.—Atlas Powder Co. A bulletin on "Ways and Means to Greater Safety" contains suggestions on priming wire connections, blasting machine operation, and illustrates three practical ways to test lead wires in the field for breaks or current leakage.

Face-Shields.—Davis Emergency Equipment Co. A bulletin has been published, covering a new line of face-shields, which are now being used to protect workers from dust, sparks, heat and glare.

Plant Equipment.—Link-Belt Co. has completed its new 1278-page general catalog No. 800. It contains list prices, dimensions, weights, and engineering data on power transmission machinery, and on equipment for handling, screening, drying, cooling, and preparing materials mechanically.

Power Transmission. — Link-Belt Co. published a 272-page book, No. 1600, which it announces as a new handbook of modern power transmission units, containing complete design and application data, dimensions, weights, and list prices of these units.

Rubber Insulated Power Cable.—Anaconda Wire and Cable Co. A new catalog includes physical and electrical characteristics for all types of rubber insulated power cables, a section on coding details of control cables, and a comprehensive section on technical data.

Screens.—HarriSteel Products Co. has issued a bulletin, describing and illustrating the qualities of "Wabbly Weave" abrasion resisting, woven wire screen cloth.

Steels.—Joseph T. Ryerson & Son, Inc., has compiled a chart giving tensile strength, yield point, elongation, reduction of area, hardness, and other average physical properties of nearly fifty different types of steels.

Tools.—Bonney Forge & Tool Works has published a 92-page catalog, No. 39, which covers the full line of Bonney alloy steel sockets, wrenches and small hand tools.

Wire Rope.—Macwhyte Co. "Life Hangs by a Thread" is the title of an interesting, illustrated booklet the Macwhyte Company has brought out which tells about how wire rope is manufactured and acknowledges the important part its employes play in producing wire and fabricating wire rope.

News of the Industry

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., reports that Stanley Michaelson, engineer in the mining division of the company, has been transferred to the Salt Lake City district office as sales engineer specializing in mining and related machinery built by the company.

Link-Belt Co., Chicago, has contracted for the construction of a new office and warehouse building in Dallas, to be located on Latimer street at the intersection of Pierce street.

Ironton Fire Brick Co., Ironton, Ohio, announces that Ed. F. Weinheimer is now representing the company in Virginia, West Virginia and western Pennsylvania. He was formerly in the by-product coke department of Great Lakes Steel Corp., Ecorse, Mich.

Naylor Pipe Co., Chicago, Ill., announces the appointment of Gene McIntyre, 727 West Seventh, Los Angeles, Calif., as the Naylor lockseam spiralweld pipe representative in California and Arizona.

Austin-Western Road Machinery Co., Aurora, Ill., reports that it plans to erect new additional buildings and consolidate all manufacturing facilities and also announces the following executive changes: vice-president F. L. Jerome has been made assistant to the president; vice-president H. M. Kleiser has been placed in charge of sales, advertising, service and research; R. K. Stiles has been made sales manager; and A. C. Teckemeyer will become manager of the governmental sales division.

Ford Motor Co., Detroit, Mich., has on exhibit at both World's Fairs trucks that have attained record breaking mileages. At the New York World's Fair is displayed a 1934 model tractor-truck which has over 784,000 miles to its credit, accumulated in 56 months of service for the Petroleum Carrier Corp. of Jacksonville, Fla., and, at the Golden Gate Exposition is displayed a 1935 model two-speed axle truck which has traveled 511,000 miles in 54 months of service for the S. H. Bacon Materials Co., Huntington Park, Calif., hauling approximately 100,000 tons of aggregates.

John A. Roebling's Sons Co., Trenton, N. J., announces the appointment of Earl N. Graf as manager of its Pittsburgh, Penn., branch located at 855 West North Ave.

Linde Air Products, Carbide and Carbon Chemical Corp., and **Haynes Stellite Co.,** New York, report that their Cleveland district offices are now located at 1517 Superior Ave.

Thomas Laughlin Co., Portland, Me., announces that D. W. Huff has been appointed general sales manager of the company. He became connected with the Thomas Laughlin Company in 1933 when he began devoting his entire time to the sale of all the lines represented by Higgins-Linde, Inc. in the Middle West. Thomas Laughlin Co. was one of those manufacturers represented. He also has been associated with the W. D. Allen Mfg. Co., and W. O. Barnes Co.

D. W. Huff

Caterpillar Tractor Co., Peoria, Ill., announces the appointment of William Blackie as controller. He was formerly supervising manager with the Chicago office of Messrs. Price, Waterhouse & Co., prominent accounting firm.

Timken Roller Bearing Co., Canton, Ohio, announces the appointment of W. Robert Timken as assistant to the president.

Farrel-Birmingham Co., Inc., Ansonia, Conn., reports that on May 13 about 6000 people attended its open house program, which included inspection tours of the plant, an exhibit of employes' hobbies, an exhibit of everyday products made on Farrel-Birmingham machinery, and a special exhibit of the shop safety committee and the first aid classes.

New Incorporations

Champlain Sand & Gravel Corp., is the name of a new Albany, N. Y., corporation. It has a capital of $20,000 in 200 shares at $100 par value, and the directors are John J. O'Brien, Stuart H. Germond and George N. Rothlauf.

Devos Block Co., Milwaukee, Wis., has been incorporated with a capital of 500 shares, no par value. Arthur W. Devos, Felix Zilisch, and Morris Holzman are incorporators.

Barney & Dickenson, Inc., Binghamton, N. Y., has been granted a charter with a capital of 1000 shares, no par value.

Cinder Block Manufacturers, Inc., 10 State St., Boston, Mass., with a capital of 200 shares, no par value, has been incorporated. Frederick S. Snyder is president; Royal Sterling, vice-president; and Park Carpenter, clerk.

Providence Crushed Stone & Sand Co., Inc., Providence, R. I., has been granted a charter. Capital is 100 shares, no par value, and incorporators are Ralph De Magistris, Carl A. De Magistris and Mariano De Magistris.

Mississippi Bentonite Co., Charleston, Miss., has been organized by J. W. Saunders, Joseph F. Ellis, and others to engage in quarrying and mining of bentonite clay and minerals.

NEWS about People

New Blood for Lime Association

KENNETH L. HAMMOND, new chairman of the board of directors of the National Lime Association, is a fine example of the present generation of Southern business executives. His

Kenneth L. Hammond

company, the Keystone Lime Works, Inc., Keystone, Shelby County, Ala., has been an active member of the National Lime Association for more than 20 years, but he is comparatively young and has been a director only for the past two years. Mr. Hammond is the secretary-treasurer of his company and has been very helpful to the Lime industry in the South, being instrumental in founding the Southeastern Lime Institute, Atlanta, Ga., of which he is also a director. The Institute is a coöperative promotional organization modeled after similar ones in the East which have been active for several years.

M. M. SMITH, manager of the La Cemento Nacional, Cia., Guayaquil, Ecuador, South America, dropped into the offices of ROCK PRODUCTS in a visit to this country where he is planning to buy machinery for the expansion of cement production in his plant. He will be remembered by many old timers in the cement business in this country where he was for many years associated with American cement mills.

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E. H. BATCHELDER, JR., former senior vice-president and director of The Insulite Co., Minneapolis, Minn., has become vice-president of the American Rock Wool Corp., Wabash, Ind.

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ROY NEHER has been appointed general superintendent of the new Savannah, Ga., plant of the National Gypsum Co., which was officially opened on May 22. Mr. Neher has had 25 years' experience in the rock products industry, having been in charge of quarries in New York and Florida. He has been with National Gypsum since March, 1926, when he set up the machinery at the Clarence Center plant. Since that time he has served the company as board superintendent for four years, superintendent of the Clarence Center plant for four years, and for six months he was superintendent of the Portsmouth, N. H. plant.

RONALD CURRY, board superintendent of the new plant, started with the company in 1927 as plant foreman at National City, Mich. Joe Brewer, chief officer clerk, has been with the company for ten years, and prior to this had been with Universal Gypsum at Fort Dodge, Iowa. Alfred Olsen is in charge of quality control at the plant. Kenneth Philbrick is the wet end foreman, and Earl Gillet is mill foreman.

•

DUFF ABRAMS, who is well-known throughout the entire cement and aggregates industry for his research work for the Portland Cement Association at Lewis Institute laboratories, has been engaged by sand and gravel and ready mixed operators of Long Island, New York, to make studies of specifications, producer-consumer relations, etc.

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F. A. GRUBB has been promoted from operator to superintendent of production for The Portsmouth Sand & Gravel Co., Portsmouth, Ohio. Mac McGinnis, pilot, has been made superintendent of transportation. B. F. France, master mechanic, is the new superintendent of maintenance and repair. Bennett McClanahan has been promoted from shore foreman to superintendent of shore operations. C. G. O'Brien is the new assistant secretary-treasurer of the company. These changes in official personnel were made following the death of Captain Chas. King, vice-president of the company.

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A. O. WALKER has been appointed manager of the Muskogee Sand and Gravel Co., Muskogee, Okla. Mr. Walker is well-known in the southwest, having been division engineer of the Oklahoma highway department for four years.

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FRED BOLAND, formerly plant engineer and assistant superintendent at the Petoskey Portland Cement Co., Petoskey, Mich., has been promoted to plant superintendent. Harold Tillotson is chief engineer, and George L. Kirp, chemical engineer has been advanced to assistant plant superintendent.

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A. C. EICHENLAUB has been appointed assistant works manager in addition to his duties as chief chemist of the Peerless Cement Corp., Detroit, Mich. After graduation from Syracuse University in 1923 with the degree of B.S. in Chemical Engineeering, he went to work as analyst for the Hudson Valley Portland Cement Co., Alsen, N. Y., where he remained for one year. He then accepted a job in a similar capacity with the Pyramid Portland Cement Co., Des Moines, Iowa. After three years, he became chief chemist for that company, continuing in that office until the Pennsylvania-Dixie Cement Corp., took over the concern. Mr. Eichenlaub remained as chief chemist of the plant for one year. He accepted the position of chief chemist for the Peerless Cement Corp., in March, 1929,

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BENJAMIN F. AFFLECK, retired president of the Universal Atlas Cement Co., Chicago, Ill., has been nominated for president of the Executives' Club of Chicago. He is first vice-president of the club.

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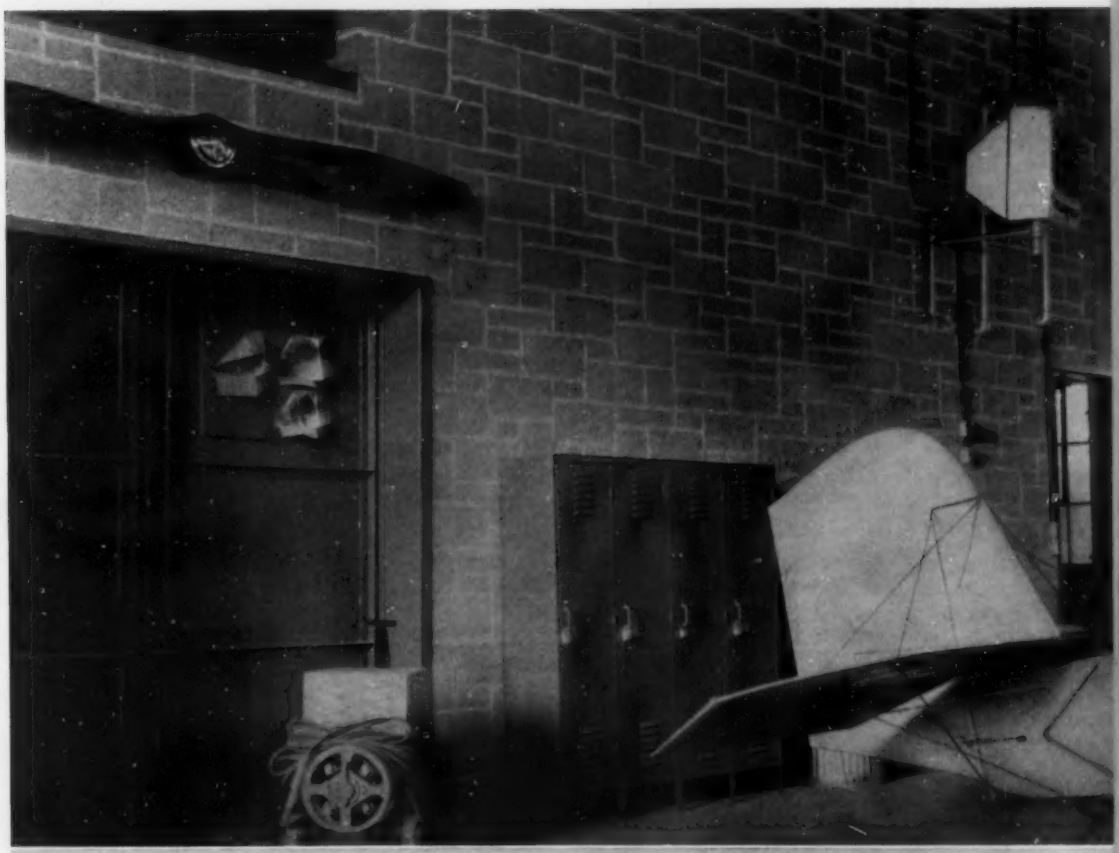
BRYNJOLF PEDERSEN, lime manufacturer of Bergen, Norway, and Dr. Ths. Svanoe, city chemist of Bergen, were recent visitors to the office of ROCK PRODUCTS. They planned to visit lime plants in this country and confer with city officials.

CONCRETE PRODUCTS AND CEMENT PRODUCTS



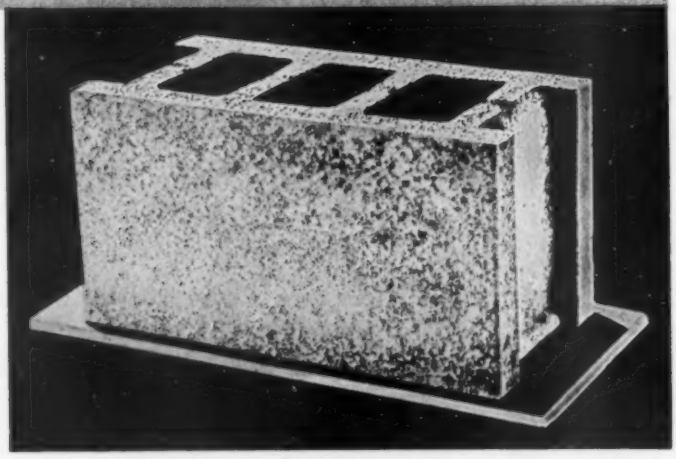
Interiors In Random Ashlar

Light-weight concrete units, exposed and untinted for maximum acoustical value, form the walls in the auditorium and aeronautic shop of St. Rita High School, Chicago, Ill.

QUALITY AND APPEARANCE
That Will "CLINCH" the Contract

for Concrete Masonry Units

"I cannot sell any other concrete block since I got the Besser with FULLY PRESSED TOP units made on Plain Pallets."—Wayne Martin, Lansing, Michigan.



FULLY PRESSED TOP BLOCKS
Made Only on Besser Plain Pallet Strippers

100% AUTOMATIC

Besser Super Plain Pallet Stripper with Automatic Pallet Feeder and Automatic Front Conveyor. Capacity: 6½ Molds per minute.

TAMPERS
BESSER PLAIN PALLET STRIPPERS
VIBRATORS

BESSER TAMPER STRIPPERS

- **Besser Super Automatic Plain Pallet Stripper** — Daily Capacity 3000 to 4000
- **Besser Victory Automatic Plain Pallet Stripper** — Daily Capacity 2000 to 2500
- **Besser Semi-Automatic Plain Pallet Stripper** — Daily Capacity 1200 to 1500
- **Besser Champion Power Operated Plain Pallet Stripper** — Daily Capacity 1000 to 1200
- **Besser Multi-Mold Hand Operated Plain Pallet Stripper** — Daily Capacity 250 to 350

BESSER VIBRAPAC PLAIN PALLET STRIPPERS

- **Besser Automatic Vibrapac Plain Pallet Stripper** — Daily Capacity 4000 to 5000
- **Besser Power Operated Vibrapac Plain Pallet Stripper** — Daily Capacity 2000 to 2500

BESSER-FLAM VIBRATOR

- **Besser-Flam Plain Pallet Vibrator** — Daily Capacity 800

West of Rockies address inquiries about this machine to:
STEPHEN FLAM, SHERMAN OAKS, CALIF.

Ask for folder "21" Advantages of Plain Pallets. Write today for details and prices. State daily production and sizes you want

BESSER MANUFACTURING CO.

COMPLETE EQUIPMENT FOR CONCRETE PRODUCTS PLANTS

Complete Sales and Service on BESSER, ANCHOR, CONSOLIDATED, IDEAL, HOBBS, UNIVERSAL, PORTLAND

107 39TH STREET **ALPENA, MICHIGAN**

EVERY CONCRETE PRODUCTS PLANT NEEDS A BESSER PLAIN PALLET STRIPPER

Roofing Tile Popularized

Develop Special Concrete Tile Machinery and Production Methods to Make Product Certified by Engineers.

By BROR NORDBERG

MIAMI, FLORIDA, where they do things in concrete, is the scene of a revival of the concrete roofing tile industry. It is only natural that there should be a call for concrete roofing tile in a city which is famed for its beautiful, modern concrete architecture, but until the last two years most of the roofs were of competitive materials.

Today it is estimated that 90 percent of the tile roofs sold in Miami and Miami Beach are of concrete, mostly white in color, and row upon row of homes with concrete roofs may be seen in driving through any of the newer residential districts. This remarkable activity parallels the short history of the Brady Roofing Tile Manufacturing Co., which at this writing is daily turning out 15,000 Mission and plain shingle tile and is planning further expansion to keep pace with demands.

L. W. Nelsen, inventor of the Nelsen concrete culvert in 1916 and now president of the Nelsen Concrete Culvert Co. of Champaign, Ill., heads this new Florida organization. There is an interesting story as to how Mr. Nelsen went into the roofing tile industry, since it was quite by accident, but it turned out to be a very profitable venture. Coming to Miami in June, 1937, to inspect some "tile" machinery which had been advertised, and which he presumed to be pipe machinery that he was considering purchasing for installation in a new plant at East St. Louis, Ill., Mr. Nelsen was quite surprised to find that it was roofing tile machinery.

Buys Tile Business "By Accident"

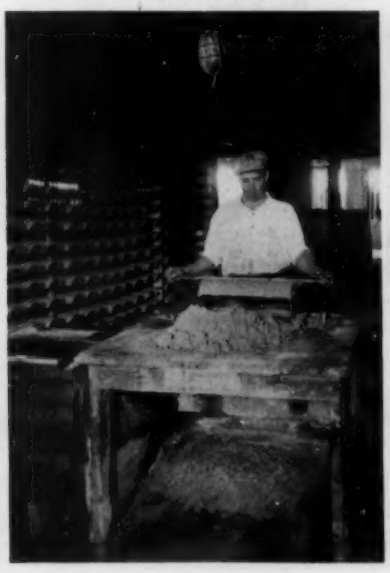
To make a long story short, Mr. Nelsen purchased the assets of the Brady Roofing Tile Manufacturing Co. the following day, with the thought that it might serve as a winter occupation. He moved to Miami that September and has been there ever since with Mrs. Nelsen and his daughter, A. Louise Nelsen, who is now his business associate.

At the time of the transaction, the previous owners of the company had sold 25,000 sq. ft. of concrete tile in seven months, but sales of clay tile shipped in from the north were far ahead. In 1938, sales exceeded 2,500,000 tile and 320,000 were sold in the month of March, 1939. From 10 to 90 squares of tile went into construction of 800 homes in 1938, including the more expensive homes for which Miami is famous.

Very little advertising was done to introduce the tile and none is being carried at the present time. At the outset, Mr. Nelsen perfected the tile machinery and the tile and set out to sell it on its merit—as a quality unit having very favorable strength and water-repellent properties. The design of the tile was made to conform to the architects' ideas and the thicknesses and shapes are according to their standards, close attention being paid to color uniformity, the shadows which will be cast in the bright sunlight and other details. Three full-time salesmen, in addition to Mr. Nelsen, are in the field contacting the architects, builders, contractors, and other prospects.

Left: Shingle tile are stripped, as shown in center, from hand tamping machines and placed on continuous circular conveyor, where they are sprayed with paint and removed to curing racks

Right: Hand-troweling a barrel-type concrete tile. Color, usually white, is sprinkled on the unit and troweled in



A strong selling point used very effectively is the certification of all roofing tile—a guarantee that each and every tile is made to a definite standard as verified by actual test. The H. C. Nutting Co., operator of laboratory and inspection services in the principal cities in the nation, was engaged to set up standards. Engineers from this organization come unannounced at no specified time to inspect the plant and equipment and to test tile picked at random.

Guarantee Tile By Test

Aggregate is tested for gradation, organic matter and other deleterious substances; the mixing time is checked; the method of application of color is observed; the length and type of curing on pallets and in stock are recorded; and flexure, crushing and absorption tests are made of the finished tile. A complete report of the tests conducted on a particular day is available to the architect without the knowledge of the Brady Roofing Tile Manufacturing Co. By this arrangement, Mr. Nelsen has set a standard for himself which requires an accurate control of mix and a high standard of workmanship.

Unusual Plant Houses 20 Tile Machines

Located on the ground floor of the old Fritz hotel, a mammoth structure of reinforced concrete which was built during the boom years but never occupied, Mr. Nelsen's plant is one of the most unique we have seen. He has plenty of covered storage space for stock, which is highly desirable, and the men always find it cool and comfortable.

Each of the 20 tile machines is located between a pair of concrete columns on one side of the building, and storage and trucking facilities are provided at the rear. The machines are all hand-tamp equipment, designed by Mr. Nelsen and manufactured by the Llewellyn Corp. of Miami.

Above: Old Fritz Hotel, of the Florida real estate boom period, serves as factory for roofing tile plant. Below: Loading a truck with "Nelsen Certified Tile"

Half of the daily production of 15,000 tile is the flat shingle type, which is an interlocking unit 8- x 15-in. in dimension and 1⅛ in. thick overall except for cored out areas on the underside to lessen the weight. A 1⅛-in. thickness, particularly on white tile, is desirable in order to cast a long shadow from the butt end of a tile on to the next course on the roof. Mission, or barrel tile, make up the rest of the production. These units are semi-circular in shape, 18-in. long and 8 in. in diameter with a thickness of ½ in. on the sides and ¾ in. at the center.

Both types are made without nail holes and are laid on a cement mortar base superimposed over slate, felt or similar roofing papers which have good bonding properties. Nailing of tile is unnecessary in Miami for rarely does a roof slope exceed a 3- or 4-in. rise in 12 in. Barrel-shaped tile are laid, as illustrated, with a 3-in. overlap at the ends and 2-in. on the sides.

Willis McNeal, foreman, left, and Glenn Wallis, mechanic, show how barrel-type roofing tile are overlapped. To the right: Demonstration roof at plant, showing how shingle tile are imbedded in mortar

Shingle-type tile are being sold for the more expensive homes, and it is of interest that nine out of ten tile sold are white. Tests in service have disclosed that white tile are much more effective in keeping out heat from the sun than dark tile, which absorb most of the heat. Thermometer readings taken under the sheathing beneath the white concrete tile average about 18 deg. F. less than when dark-colored competitive tile are used. No wonder Miami's new roofs are white!

The payroll in all includes 68 men, 20 of whom operate the 20 machines—all hand-tamped. Centrally located are two Blystone one-bag, batch-type mixers for the entire plant, from which concrete is wheeled to each operator's table. Local stone screenings, 100 percent minus 4-mesh, are used for the Mission tile and a finer (minus 8-mesh) light-colored, natural sand for the shingle type. Mixing time on the average is two minutes dry and three minutes wet, with a rich mix of one sack of portland cement to 275 lb. of sand for both types of tile. The mix contains just enough water so that when squeezed by hand, the mixture will hold shape.

Pallets are coated with paraffin oil and the tile, both types, are hand formed and troweled as illustrated. The pan, or under-barrel tile, is not colored except when other colors than white are specified.

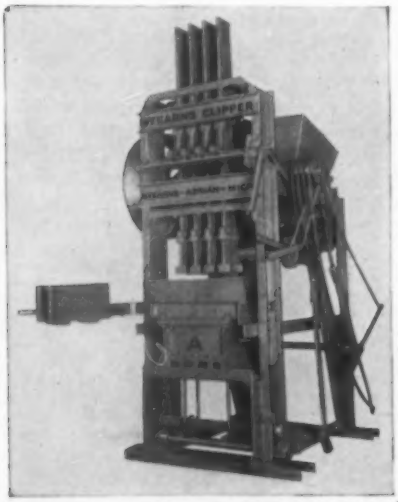
Color Applied In Two Ways

Color is applied in two ways; by a spray gun for a surface finish, and by troweling it into the finished surface of the tile—the latter method being preferable. White coloring consists of equal parts of white sand and white portland cement mixed dry for 30 minutes in a color mixer. In application by the troweling method, a sifter similar to a housewife's sieve for flour is used to spread the color mix uniformly over the surface of the tile. It is then troweled in and the process repeated to give a uniform color which is actually part of the tile. Water is added to the color mix, for spraying by gun, and color is applied as the tile pass over a circular carrier slowly conveying the tile from the tile maker's machines toward the gun operator. Mineral oxides are used for other colors, red being a standard but others are made to order.

Customary procedure is to stack the tile for 24 hr. on the pallets before stripping, to spray all tile three or four times daily with water and to cure them a minimum of 28 days before shipment. Normally 250,000 tile are kept in stock, and all deliveries are made by truck. The mortar mix for the tile bed recommended is four parts sand, one part cement and one-half part lime. Willis McNeal is foreman of the plant.

Illinois Concrete Products Manufacturer in Florida

L. W. NELSEN, owner and operator of the Brady Roofing Tile Manufacturing Co., Miami, Fla., has had a wealth of previous experience in concrete products manufacturing. As president of the Nelsen Concrete Culvert Co., Champaign, Ill., he has been a prime mover in that concern's growth. Recently divisional plants were opened at E. St. Louis, Ill., and Harrisburg, Ill., primarily to make concrete pipe. At Champaign activities have been broadened to include the manufacture of haydite blocks, joists and roofing tile on a small scale.



L. W. Nelsen and his daughter, A. Louise Nelson, is associated with him

Born in Denmark, Mr. Nelsen came to this country in 1903 and, without benefit of higher education, began contracting for concrete sidewalks and other small jobs in Pontiac, Ill. Then he contracted for several concrete bridge jobs and while engaged in this work developed his idea for the original Nelsen concrete culvert. This unit was patented in 1916 and the company which he now heads as president was organized.

Asbestos—Cement Pipe Unit to Cost $200,000

ASBESTOS-CEMENT PIPES, INC., Woodridge, N. J., recently organized, has let a contract to F. L. Smidth Co., New York, N. Y., for the design and construction of a new plant on a 30-acre tract near Saddle River Road, Woodridge. The plant, which will make pipe and other cement products, will cost over $200,000 with equipment.

Concrete Units for Big Eastern Housing Project

FIRESAFE HOUSING CORP. is now erecting in Southbridge, Mass., an entire subdivision using concrete masonry construction. High pressure, steam-cured concrete products are being furnished by Atlantic Brick & Tile Co., Watertown, Mass. The houses were designed on a modular basis to compete with the low cost houses of less permanent character.

Units made with light weight aggregates are used for all purposes above the foundation walls. A floor system designed by Thompson & Lichtner Co., employing rectangular joists, 4- x 8-in. section, spaced 3-ft. centers, supporting light weight slabs 1½- x 3-ft., is said to have several

advantages. The beams and slabs, when left exposed and painted present a very attractive beam ceiling. Floor slabs are covered either with colored, reinforced granolithic or hardwood flooring. There are three basic designs, including one 4-room and two 6-room houses, the 4-room houses selling for $3500, and the 6-room houses, $4200 and $4300.

New Concrete Block Plants

BUILDERS SUPPLY CO., Rantoul, Ill., a new company owned by H. G. Pendergast, has entered the concrete products business and has purchased a Besser block machine. A lumber business will also be conducted by this firm.

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CAROLINA ICE & FUEL CO., Elkin, N. C., has established a plant to manufacture cinder concrete block. L. G. Meed is the owner. An addition will be built to the present structure to house the block machinery.

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JOHN BURGBACHER LUMBER CO., INC., Woodsfield, Ohio, has installed a new Niles concrete block machine designed to produce six different sizes of block. It is reported that the company will make a type of block which is keyed together by a mortar key when laid up, presenting a solid wall effect. The blocks are standard 8- x 8- x 16-in., but are also made in quarter, half and three-quarter sizes.

Sand Company to Make Brick

LAKE WALES INDEPENDENT SAND CO., Lake Wales, Fla., has purchased equipment and is now manufacturing Dunbrik. Emil R. Johna, owner of the company, in addition to producing sand from a new plant, manufactures a varied line of concrete product specialties.

New Ready Mixed Plants

SEVERAL new ready mixed concrete plants have been announced during the past month. Espy Paving & Contracting Co., Savannah, Ga., has plans to build a ready mixed concrete plant. This step was taken to supply contractors who have been busy meeting demands for new housing in the Savannah area. The mixes of this company have been designed by the Georgia School of Technology in Atlanta.

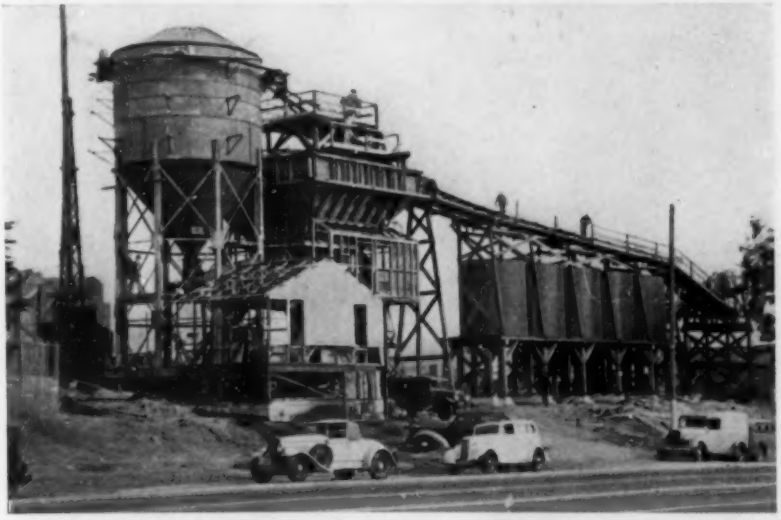
O'Rourke Construction Material Co., Des Moines, Iowa, has taken over the ready-mixed concrete business of the Perkins Supply & Fuel Service, Des Moines, Iowa.

California Ready-Mix Plant Is Modernistic

GOLDEN GATE ATLAS MATERIALS CO., Colma, Calif., has proved that it is possible to build a ready-mixed concrete plant which has pleasing architectural lines without in any way detracting from the utility of the structure. In the January, 1939, issue of ROCK PRODUCTS, construction views of the plant were published. On this page are shown two views, one depicting the completely enclosed plant and the other, a construction view. As the structure was near a residential section, it was desired to give the plant an appearance in keeping with the surroundings, and therefore the company went to considerable expense. This plant, which is operated by a subsidiary of Pacific Coast Aggregates, Inc., San Francisco, Calif., comprises a Blaw-Knox batching unit, bulk cement facilities, and a 2-cu. yd. mixer in which the concrete is "shrunk" before being placed in the truck mixers.

Concrete Block Ordinance

LA CROSSE, WIS., city council has introduced an ordinance regulating the manufacture of concrete blocks. The ordinance provides specifications for hollow, load-bearing concrete masonry units and for the marking of such blocks and their testing. Section one of the ordinance provides that in order to promote and encourage quality of building construction and to insure proper manufacture and use of concrete masonry units, there is provided certain minimum standards, provisions and requirements for safe design.



Above: Completed ready mixed concrete and aggregates plant of Golden Gate Atlas Materials Co., Colma, Calif., has pleasing modernistic architectural lines. Below: Construction view before a decision was made to enclose plant

Sweden Using Ready Mix

Trucks hauling ready mixed concrete have cannon-shaped drums which tilt up to receive batch and down to pour

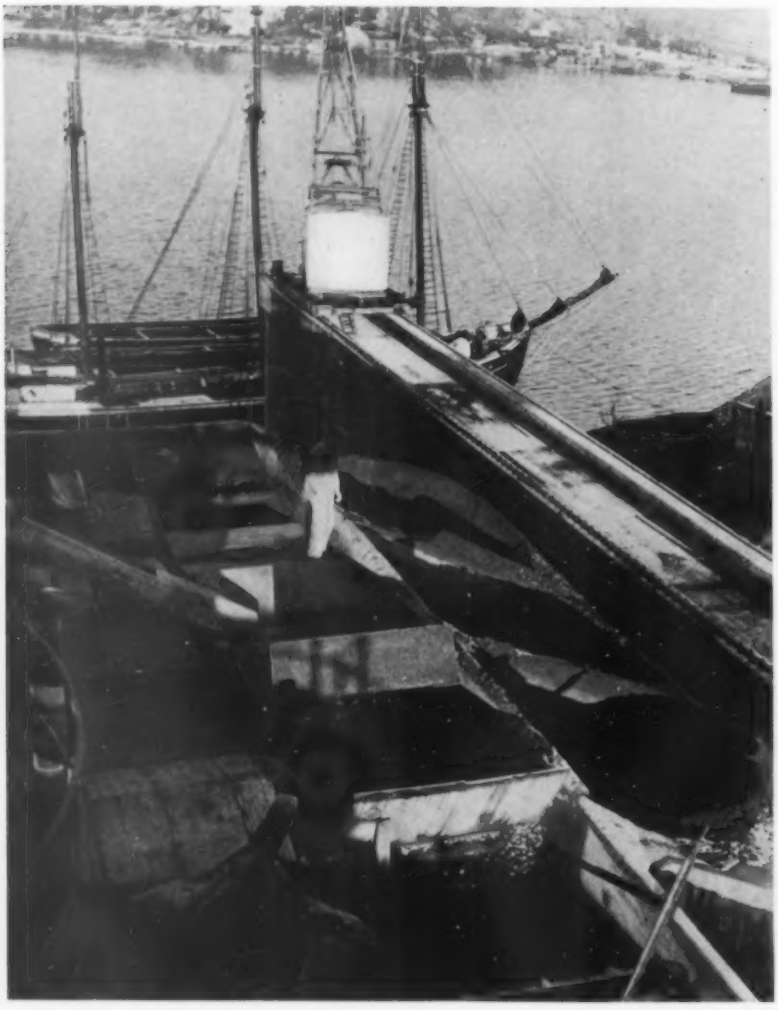
BY ARNE THUNGSTROM

PROFITING by the experience of American companies in developing the ready mixed concrete business, Sweden has adopted many of the practices and equipment which may be found in the United States. In 1931, the first ready mixed concrete plant was established by Aktiebolaget Betongindustri, Stockholm, with some of the largest building contractors as stockholders and architect Axel Erikson as general manager.

As the plant is located at quayside, the sand and gravel is obtained from barges and cement is shipped in bulk by schooners from the cement works in south Sweden.

Some of the principal features of the ready mixed concrete plant follow: (a) storage space for about 15,000 cu. m. sand and gravel with a swinging crane for unloading and handling; (b) plant building has 18 bins, each holding from 20 cu. m. to 30 cu. m. for various sizes of sand, gravel and bulk cement; (c) a weigh room with three mixers of 1.5 cu. m. capacity; (d) an emergency belt conveyor for use on rare occasions when swinging crane fails; (e) bulk-cement-handling equipment and cement storage silo; (f) office building and laboratory; (g) boiler for heating water and aggregates during winter.

Cargo of barges and schooner being unloaded to top of concrete mixing plant by means of crane operating on track. Note various concrete bins to hold different size aggregates



One-Man Control of Mixing

Weighing scales above each mixer, operated by levers, are fed by chutes from the bins on the floor above. In this way the mixer operator has full control of the flow of the various aggregates, cement and water. Water is supplied from an accurately graded tank through a manually operated valve. When the batch is weighed it is discharged, by opening the bottom of the scale chute, into the mixer, where the water is added and the batch mixed for about a minute and a half. The mixer is then tilted and the concrete discharged into one of 24 trucks of the agitating type, each holding 1.25 cu. m.

Bulk-cement-handling equipment consists of a Fuller-Kinyon pump stationed at the quay for unloading the schooners which moves about 35 tons per hr. Cement is pumped from the boats into the four-compartment silo under which is another pump on rails that can be shifted from one compartment to another. This pump elevates the cement into the hoppers above the mixers.

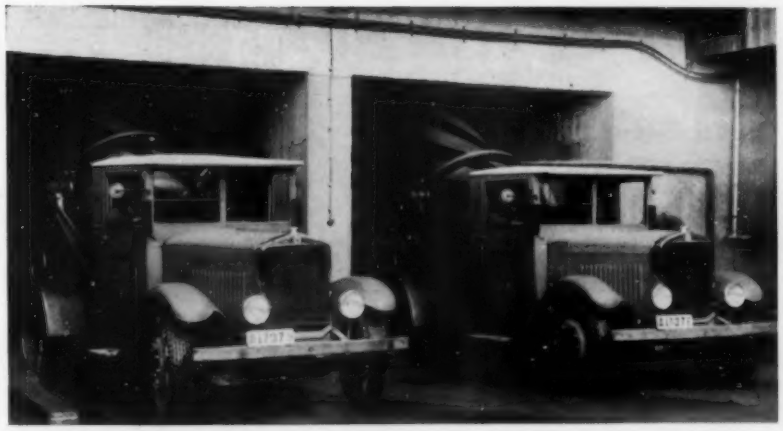
Before the winter season starts all available storage space is crammed with sand and gravel, enough to last until the lake is again free from ice —about three or four months. During the winter all materials, with the exception of cement, are heated by steam-pipes thrust into the bins. Water is also heated by steam, mak-

ing it possible to deliver a concrete with a temperature of about + 24 deg. C., suitable for concrete work in cold weather.

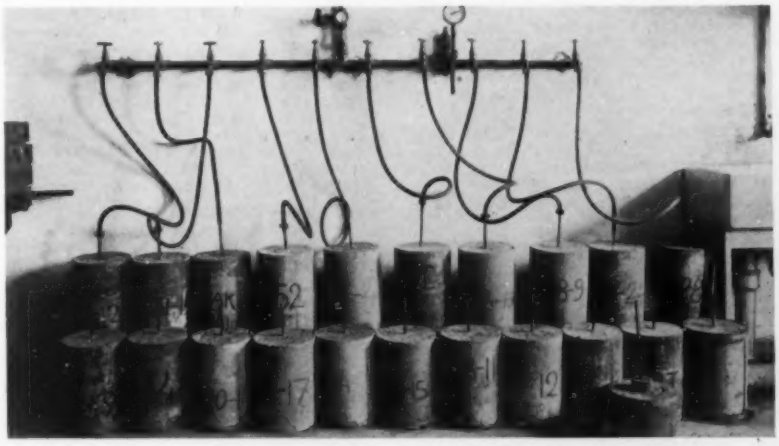
Laboratory Methods and Equipment

Incoming raw materials and cubes of the delivered concrete are tested daily in the plant laboratory. Concrete, specially designed for water tightness, is tested for impermeability with special test cylinders of concrete.

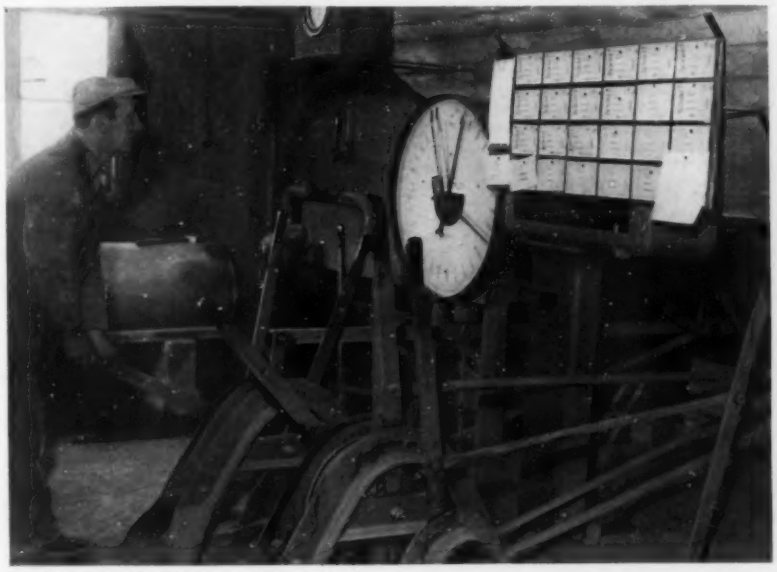
We have worked out a very simple method for this test. The concrete to be tested is poured in a cylindrical form to half the height. To make the test, a small cylinder of porous brick, about 2- x 2½-in., with a brass pipe fixed into it, fastened with bitumen, is inserted in the concrete. The form is then filled completely with concrete. When it has hardened, the brass pipe is connected to a water-pipe and set under a pressure of about 5.5 kilogram per sq. cm. When the test cylinder has been under pressure for seven days and no water has penetrated to the sides, the concrete is considered watertight. If the cylinder is split, it is possible to see how far the water has penetrated.



Loading the trucks with ready mixed concrete. Note tilting drums in position to receive concrete



Above: Cylinders of concrete under test for water tightness. Below: Operator in the weighing room of batching plant looking at cards which record the mix desired



When a telephone order for concrete is received, a form is written out stating that, say, truck No. 20 shall have a mix of 225 kilogram cement per cu. m. of concrete, using coarse gravel, and mixed to a wet consistency. This order is sent by tube to the plant where the mixer operator receives it.

Keep Card Index of Concrete Mixes

In front of this operator is a board with cards, on each of which is worked out the weights of the various aggregates for a certain mix. Information on cards is calculated for different moisture contents of sand and gravel and is, therefore, revised with every change. The board holds 60 cards and if the operator cannot find the required mix, he has to look it up in a file containing about 1000 cards.

When the concrete is discharged into the truck, the mixer operator sends down the order to the driver, who takes it to the office where a delivery order is written out. In this way, we are absolutely sure that the truck contains the right mix. It is essential that mixes be carefully controlled considering the fact that some days we have as many as 40 different jobs and perhaps every mix may be different.

Our largest job was for the Traneberg bridge, connecting Stockholm with one of its eastern suburbs, to which about 22,000 cu. m. were delivered, and our largest pour at one stretch was 1746 cu. m. to the bottom of a water reservoir. Maximum output during an 8-hr. day is 373 cu. m.

Traffic and Transportation

PROPOSED RATE CHANGES—The following are the latest proposed changes in freight rates up to and including the week of June 17:

Central

58172. Establish on **crushed stone** and **crushed stone screenings**, C. L., in open top cars, Wabash, Ind., to various destinations on N. Y. C. Sys. in Indiana, Michigan and Ohio; C.C.C. & St. L. Ry.: Benton Harbor, Mich, 116; Eau Claire, Mich., 110; Niles, Mich., 105; Granger, Ind., 99; Warsaw, Ind., 77; Claypool, Ind., 72; North Manchester, Ind., 66; Jonesboro, Ind., 72; Cincinnati, Ohio, 149. N. Y. C. R. R.: Morehous, Ind., 99; White Pigeon, Mich., 105; Sturgis, Mich., 110; Bur Oak, Mich., 116; Batavia, Mich., 121; Allen, Mich., 127; Hillsdale, Mich., 132; Hudson Mich., 138; Blissfield, Mich., 143; Ottawa Lake, Mich., 143; Sylvania, Ohio, 171; Wellsville, Mich., 143; Ida, Mich., 149; Morenci, Mich., 149; Fayette (Ful. Co.), Ohio, 171; Tecumseh, Mich., 143; Norvel, Mich., 138; Millersburg, Ind., 105; Ligonier, Ind., 110; Kendallville, Ind., 116; Corunna, Ind., 121; Butler, Ind., 127; Edgerton, Ohio, 138; Stryker, Ohio, 149; Wauseon, Ohio, 149; Holland, Ohio, 160; Toledo, Ohio, 171; Academie Ind., 127; Auburn Jct., Ind., 121; Summit (DeKalb Co.), Ind., 121; Angola, Ind., 127; Montgomery, Mich., 132; Bankers, Mich., 121; Hanover, Mich., 132; Jackson, Mich., 138; Somerset Centre, Mich., 138; Bridgewater, Mich., 143; Constantine, Mich., 110; Moore Park, Mich., 116; Kalamazoo, Mich., 121; Otsego, Mich., 127; Allegan, Mich., 132; Hilliards, Mich., 138; Grand Rapids, Mich., 143; Middlebury, Ind., 105; Shipshewana, Ind., 110; Litchfield, Mich., 132; Eaton Rapids, Mich., 143; Lansing, Mich., 149; Cincinnati Northern R. R.: Hudson, Mich., 138; Ney, Ohio, 149; Latty, Ohio, 160; Michigan Central R. R., the following Michigan points: Grand Beach, 121; Three Oaks, 116; Buchanan, 110; Lawton, 121; Comstock, 127; Augusta, 132; Battle Creek, 132; Marengo, 138; Francisco, 149; Chelsea, 154; Centerville, 121; Wasepi, 127; Concord, 138; Boroda, 116; Bertrand, 110; Alamo, 132; Grand Junction, 138; South Haven, 138; Rives Jct., 149; Charlotte, 154; Vermontville, 160; Middleville, 165; Leslie, 149; Bath, 154; Laingsburg, 160; Owosso, 160; Oakley, 165; Saginaw, 171; C. K. & S. Ry., Richland Jct., 127; Hooper, 127; Delton, 127; to Webster, Ind., on the Michigan Central R. R. 110.

58186. Establish on **crushed stone** and **crushed stone screenings** in open top cars, C. L., Logansport, Ind., to Lebanon, Ind., 77c per net ton, via P. R. R. direct.

58193 (2). Establish on (a) **limestone, agricultural, and screenings, agricultural limestone**, unburnt in bulk in open top cars only, C. L., and (b) **agricultural limestone**, unburnt, **agricultural limestone meal or agricultural limestone screenings**, in box cars, min. wt. 50,000 lb., to Cumberland, Ohio, from Carey, Ohio, and Marion, Ohio. Description (a) 149c and 138c, respectively, and description (b) 165c per net ton; from Carey, Ohio, to Geauga Lake, Mantua and North Industry, Ohio. Description (a) 138c; to Smithfield, Ohio, (description (a) 160c per net ton, from Marion, Ohio, to North Industry, Ohio, description (a) 127c per net ton.

58198. Establish on (a) **sand, industrial**, in all kinds of equipment, C. L.; sand (except industrial), in closed equipment, C. L.; (b) sand, ground or pulverized, in all kinds of equipment, C. L.; (c) sand (except industrial), in open top equipment, C. L. (see note), Ottawa, Ill., dist. to Carteret, N. J., (a) 462c; (b) 508c and (c) 462c per net ton. Note—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

58232. Establish on **agricultural limestone**, unburnt, in bulk, C. L., in open top cars, Greencastle, Ind., to Mattoon, Ill. 77c; Shelbyville, Ill., 88c, and Pana, Ill., 99c per net ton via C. C. C. & St. L. Ry. direct.

58238 (1). Establish on (a) **sand, industrial**, in all kinds of equipment, C. L.; sand (except industrial), in closed equipment, C. L.; (b) sand, ground or pulverized in all kinds of equipment, C. L.; (c) sand (except industrial), in open top equipment, C. L. (See Note), Copley, Ohio, group to Tremley, N. J., (a) 341c; (b) 375c, and (c) 341c per net ton. Note—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

58271. Establish on **sand**, (except industrial), in open top equipment, C. L. (rates will not apply on shipments in cars with tarpaulin or other protective covering) to Wheeling, W. Va., from Barr, Beach City, Dundee and Massillon, Ohio, 110c; New Cumberland, Ohio, 88c and Somerdale, Ohio, 99c per net ton, via W. & L. E. Ry. direct.

58270 cancels W. D. A. 57846. Establish on **limestone**, ground or pulverized, unburnt, C. L., min. wt. 60,000 lb., from Northwestern Ohio Group 1 origins and Marble Cliff and West Columbus, Ohio, to C. & O. Ry. stations in Kentucky ("1" refers to proposed rate from Gibsonburg, Ohio, and "2" refers to proposed rate from Marble Cliff and West Columbus, Ohio) to Lockwood, (1) 226, (2) 176; Walbridge, (1) 237, (2) 187; Kise, (1) 237, (2) 193; Rock Branch, (1) 248, (2) 193; Thealka, (1) 248, (2) 204; Stafford, (1) 259, (2) 204; Carver, (1) 259, (2) 215; Van Lear No. 155, (1) 259, (2) 204; Dwale, (1) 259, (2) 215; McDowell, (1) 259, (2) 226; Wheelwright, (1) 270, (2) 226; Dinwood, (1) 259, (2) 215; Bosco, (1) 259, (2) 226; Wayland, (1) 270, (2) 226; Boldman, (1) 259, (2) 215; Ellwood, (1) 281, (2) 226; Dunham, (1) 292, (2) 237; Sutton, (1) 270, (2) 226; Marrowbone, (1) 281, (2) 226; Elkhorn City, (1) 281, (2) 226.

58290. Establish on **crushed stone** moving in three car lots, in open top equipment, Greenfield, Ohio, to Waverly, Ohio, 40c per net ton, to expire Dec. 20, 1939.

58346. Establish on **sand**, as described in Item 1285-C, Sup. 35 to CFAL Trf. 155-T, Porter, Ind., to Duluth and Steelton, Minn., 356c per net ton.

58366. Establish on **crushed stone or stone screenings**, in straight or mixed C. L., Milltown and Marengo, Ind., to Evansville, Ind., 90c; Gentryville, Ind., 86c; Boonville, Ind., 88c per net ton. (Will apply only on traffic moving in open top cars.)

58381. Establish on **sand**, all kinds, and **gravel**, C. L., in open top cars, Akron, Ohio, to Brittain, Ohio, 40c per net ton.

58403. Establish on sand as described in WTL Trf. 41-Z, viz.: (a) **Sand** (industrial), in all kinds of equipment; **sand** (except industrial) in closed equipment; (b) **sand**, ground or pulverized, in all kinds of equipment; (c) sand (except industrial), in open top equipment (see note), Millington, Oregon, Ottawa, Sheriden, Utica and Wedron, Ill., to Windsor, Ont., (a) 334c; (b) 360c, and (c) 334c per net ton. Note—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

58433. Establish on **ground** or **pulverized stone**, C. L., Chicago, Ill., to Lowell, Ind., 88c per net ton.

58434. Establish on **sand**, naturally bonded moulding, C. L., min. wt. as per B. & L. E. R. R., Trf. I. C. C. 1128, Kicksonburg, Penn., to Erie, Penn., 110c per net ton, via B. & L. E. R. R. direct.

58435. Establish on **stone**, crushed, **slag** or **gravel**, coated with oil, tar or asphaltum (see Note), in open top equipment, C. L., Ashtabula, O., to Painesville, O., 84c per net ton, via N. Y. C. & St. L. R. R. direct. Note—The oil, tar or asphaltum not to exceed 10 per cent by weight of the commodity as shipped, the shipper to so certify on shipping order and bill of lading.

58436. Establish on **slag** (a product of iron and steel blast or open hearth furnaces), crushed or crushed commercial, and **slag** (except crushed or crushed commercial slag), C. L. Lorain and South Lorain, O., to Alexandria, Ind., 171c per net ton.

58461. Establish on **stone**, viz.: quarry scrap, mill waste and rip rap, C. L. (see Note 3), Shimer, O., to Ironton, O., 88c per net ton, to expire Dec. 31, 1939.

58462. Establish on **sand** (except industrial) in open equipment, C. L. (see Note), and in closed equipment, C. L., from the so-called Vassar Group, viz.: Vassar, Wampson, McHale, Juniata and Watrousville, Mich., to Elmira, N. Y., 297c per net ton. Note—Rates will not apply on shipments in cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

58516. Establish on **sand** all kinds, or **gravel**, in open top equipment, C. L., Phalanx, O., to Alexanders, O., 99c per net ton.

58604. Establish on **sand**, C. L., from the Ottawa, Ill., group (as described in W. T. L. Tariff 41-Z), to Oshawa, Ont., 550c per net ton.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Note 4—Reason: No present or prospective movement.

58655. Establish on (a) **sand**, industrial C. L.; **sand** (except industrial) in closed equipment, C. L. (b) **sand**, in all kinds of equipment, C. L. (c) **sand** (except industrial), in open top equipment, C. L. (see Note), to Elmira, N. Y., from Grand Haven, Muskegon and Rosy Mound, Mich., (a) 352c; (b) 387c, and (c) 352c per net ton. Note—Rates will not apply on shipments in open top cars with tarpaulin or other protective covering. In such instances the rates applicable on shipments in box cars are to be assessed.

Trunk

37484. **Slag**, crude or granulated, C. L. (product of iron and steel furnaces), in open top cars, from Manville, N. J., to Dover, N. J., $2.64 per net ton.

37721. **Sand**, common or building (industrial) and gravel, C. L. (See Note 3), from Boonville, N. Y.

To the following Erie R. R. Stations in New York State: Chemung, $2.09; Wellsburg, $1.98; Elmira, $1.98; Watkins Glen, $2.09; Montour Falls, $2.09; Pine City, $1.98; Seeley Creek, $1.98; East Corning, $1.87; Painted Post, $1.87; Erwins, $1.98; Addison, $1.98; Rathbone, $1.98; Cameron Mills, $1.98; Cameron, $1.98; Adrian, $2.09; Canisteo, $2.09.

37731. **Lime**, common, hydrated, quick or slaked, C. L., min. wt., 36,000 lb.

Base point	To Montreal, Que. Rate	Joliette, Que. Rate
Bellefonte, Penn.	32	34
Reading, Penn.	33	35
Philadelphia, Penn. ..	33	35
Frederick, Md.	37	39
Hagerstown, Penn. ...	39	40
Baltimore, Md.	37	39
Harrisburg, Penn.	36	37

Base point	To Sherbrooke, Que. Rate	Kitchener, Que. Rate
Bellefonte, Penn.	37	27
Reading, Penn.	36	32
Philadelphia, Penn. ..	36	34
Frederick, Md.	39	34
Hagerstown, Penn. ...	41	34
Baltimore, Md.	39	35
Harrisburg, Penn.	38	32

(Rates in cents per 100 lb.)

37732. **Mica** scrap and mica ore, crude, waste, in straight or mixed C. L., min. wt., 50,000 lb., from Godfrey, Ont., to Rutherford, N. J., 33c per 100 lb. in lieu of current rate of 40c per 100 lb.

37733. **Feldspar**, crude, C. L., min. wt., 100,000 lb., from Trout Creek, Ont., to Genesee Dock (rail delivery), N. Y., 14c per 100 lb. Reason—Comparable with rates from other points.

37751 (Increase). Cancel commodity rate of $2.22 per gross ton on **limestone**, crude, fluxing, foundry and furnace, C. L., from York stations, Penn., to Williamsport stations, Penn., as published in P. R. R. Tariff I. C. C. 1485. (See Note 4.)

37776. **Talc tailing**, C. L., min. wt. 70,000 lb. ("1" refers to proposed rates from Natural Bridge, N. Y., and "2" refers to proposed rates from Emeryville, Hailesboro and Talcville, N. Y.)

To Actonvale, Que., (1) 24, (2) 22; Brockville, Ont., (1) 18; (2) 15; Cornwall, Ont., (1) 20, (2) 18; Hull, Que., (1) 20, (2) 18; Louisville, Que., (1) 25, (2) 24; Magog, Que., (1) 25, (2) 24; Montreal, Que., (1) 22, (2) 20; Ottawa, Ont., (1) 20, (2) 18; St. Jerome, Que., (1) 22, (2) 21; Sherbrooke, Que., (1) 25, (2) 24; Trois Rivieres, Que., (1) 25, (2) 24; Toronto, Ont., (1) 25, (2) 25; Hamilton, Ont., (1) 25, (2) 25; Kitchener, Ont., (1) 26, (2) 26; Valleyfield, Que., (1) 20, (2) 18.

Rates in cents per 100 lb. Reason: Comparable with rates from and to other points in immediate vicinity.

37780. **Limestone, crude, fluxing, foundry and furnace** when loaded in bulk, in open top equipment, C. L. (See Note 3), from Shainline, Penn., to Buffalo and Lackawanna, N. Y., $1.79 per gross ton, in lieu of current commodity rate of $2.08 per gross ton.

37797. **Sand** (other than industrial) and **gravel** in open top cars without tarpaulin and other protective covering, C. L. (See Note 3), from Cleveland, N. Y., to Elmira, N. Y., $1.65 per net ton. Reason—Comparable with rates from and to other points in immediate vicinity.

37790. **Sand, common or building** (not industrial), C. L. (See Note 3), from Boonville and Alder Creek, N. Y., to Westmoreland and Bartlett, N. Y., $1.21 per net ton, in lieu of current commodity rates of $1.32 and $1.43 per net ton, respectively.

37793. **Sand**, naturally bonded molding, in open top cars, or in box cars, C. L. (See Note 3), from Catasauqua, Penn., to Spring City, Penn., $1.32 per net ton. Reason—Comparable with rates from and to other points in immediate vicinity.

37796 (increase). Cancel commodity rate of 66c per 100 lb. on **mica** (splittings), L. C. L., from New York, N. Y., to Massena, N. Y., as published in N. Y. C. Tariff I. C. C. N. Y. C. 16247. (See Note 4.)

37813. **Limestone, crude, fluxing, foundry and furnace**, when loaded in bulk, in open top equipment, C. L., min. wt. (See Note 3), from Naginey, Penn., to Buffalo and Lackawanna, N. Y., $1.79 per gross ton, in lieu of current commodity rate of $2.10 per gross ton.

Southwestern

16901 (1). **Lime**, Cape Girardeau, Mosher, Ste. Genevieve, Mo., to Mobile, Ala. Establish rate of $3.36 per ton of 2000 lb. on lime, C. L. min wt. 50,000 lb. from Cape Girardeau, Mosher and Ste. Genevieve, Mo., to Mobile, Ala.

19277. **Gravel**, C. L. Establish 110c net ton from Scotts, S. C., to Aynor, Conway, Loris and Myrtle Beach, S. C. Truck competitive. Expires Dec. 31, 1939.

Illinois

I. R. C. 7497-16. **Agricultural limestone**, unburnt, in bulk, C. L., in open top cars (See Note 3).

From	(1) Pres.	(1) Pro.	(2) Pres.	(2) Pro.
E. St. Louis..	84	77	97	77
Krause	95	88	108	88
Valmeyer	100	94	113	94

From	(3) Pres.	(3) Pro.	(4) Pres.	(4) Pro.
E. St. Louis..	97	88	111	99
Krause	108	99	122	110
Valmeyer	113	105	128	116

(1) To Pana, Ill. (3) To Mattoon
(2) To Shelbyville (4) To Charleston

IRC 7899-A. **Limestone, crushed or ground**, C. L. (See Note 3), but not less than 40,000 lb., from Quincy, Ill., to Rock Island, Ill. Present—$1.80 net ton. Proposed—$1.25 net ton.

7959-A (I. R. C.) **Agricultural limestone**, also ground limestone dust and limestone, ground, C. L., to stations on Wabash R. R. in Illinois: From Krause, Ill. (The number "1" refers to the present rate; "2" to the proposed.) Nameoki to Mt. Olive, (1) 80, (2) 77; Litchfield, (1) 84, (2) 80.

From Valmeyer, Ill.: Nameoki to Mt. Olive, (1) 89, (2) 83; Litchfield, (1) 89, (2) 86; Honey Bend, (1) 98, (2) 95; Raymond, (1) 98, (2) 95; Clarksville, (1) 103, (2) 101; Taylorville, (1) 108, (2) 105.

8566-A (I. R. C.) **Sand or gravel** (common river), straight or mixed C. L., from Mt. Carmel, Ill. (Rates in cents per net ton.) To St. Elmo, Ill.: Present—No specific commodity rates. Proposed—124. To Opdyke, Ill.: Present—No specific commodity rates. Proposed—110.

IRC 8825. **Sand, silica**. C. L. (See Note 3), but not less than 40,000 lb., Ottawa and Utica, Ill., to Collinsville, Ill. Present $2.93 net ton. Proposed $1.53 net ton.

Southern

46998 (1-R). **Crushed stone**, C. L., min. wt. 50 net tons, except where cars of lower capacity are furnished for carrier's convenience, the marked capacity of the car will be the min. wt., from Lynn, Mass., to Auburn, Augusta, Lewiston, Waterville and Winthrop, Me. Present commodity rates as per B. & M. I. C. C. A-2959. Proposed, $1.75 net ton. Reason: To enable the rail carriers to receive a haul on this material.

47482. (1-R)—**Crushed stone**, min. wt. 50 net tons, except that when cars of lower capacity are furnished for carriers' convenience, the C. L. min. wt. will be the market capacity of the car, Greenfield to North Adams, Mass. Present 88c net ton (commodity rate as per B. & M. I. C. C. A-2965). Proposed—60c. Reason—To enable the B. & M. to receive a haul on this material.

New England

19148. **Crushed stone**, C. L. Establish 85c net ton from Boxley, Va., to Norfolk; Naval Operating Base, Hampton Roads, (Sewalls Point), and Sewalls Point, Va. Rate not to include switching charge of the U. S. Government to Naval Base. Water competitive. Expires December 31, 1939.

19152. **Lime**, C. L. Establish from Knoxville, River Front Extension and S. Knoxville Extension, Tenn., to Roebling, N. J., 572c, min. 30,000 lb., and 457c net ton, min. 50,000 lb.

Texas-Louisiana

19373. **Stone, broken**, C. L. Establish from Balsam and Sylva, N. C., to Hamilton, Ont., 43c; Montreal, Que., 49c and Niagara Falls, Ont., 39c cwt.

19411. Establish 40c net ton on **agricultural limestone** from Cedar Bluff, Ky., to Madisonville, Ky. Truck competitive. Expires Dec. 31, 1939.

19415. **Sand**, C. L. Establish 46c net ton. Crossley, Edgar and Interlachen, Fla., to Gainesville and Palatka, Fla. Truck competitive. Expires Dec. 31, 1939.

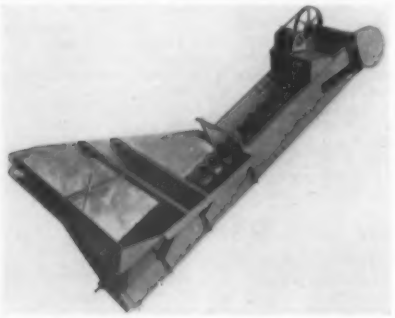
Western Lime Rates

WITH A VIEW to giving recognition to new groupings made in recent years, the official territory railroads have asked the I. C. C. to modify its order in No. 19975, Northwestern Ohio Lime Manufacturers et al vs. Pennsylvania et al., and cases joined therewith. The question of groupings has arisen in connection with their desire to publish rates on lime from points west of the Ohio-Indiana state line to give shippers from west of that line the benefit of reductions in the level of rates established in the Northwestern Ohio Lime Manufacturers Case, 159 I. C. C. 9, without undertaking to adhere to the groupings made under the old McGraham class rate formula.

NEW MACHINERY AND EQUIPMENT

Triple Function Sand Classifier

SMITH ENGINEERING WORKS, Milwaukee, Wis., has developed a sand classifier, operating on the same principle as the Telsmith sand drag, which dewaters, re-



Sand classifier with 20-in. x 15-ft. single screw has a capacity of 25 to 30 cu. yd. of coarse sand per hour

washes, and classifies sand, according to the manufacturer. To secure closer gradation of fine and coarse sands, the water capacity has been increased and a larger screw is furnished, greater in length and with a spiral of shorter pitch set at a steeper angle. It is claimed that the new sand classifier not only produces a well-watered product, but is capable of handling larger water capacities. Water overflow velocity and size of finished product are regulated by a quickly adjusted control. The classifier is made in single and double screw types with sand capacities from 10 to 60 cu. yd. per hr.

Heat-Resisting Steam Hose

THE B. F. GOODRICH CO., Akron, Ohio, has developed a steam hose which is said to make for prolonged life in this severe service. The tube of the hose is made from an improved compound possessing heat-resisting properties. On sizes 1¼-in. and larger, one ply of strong asbestos woven fabric and a spiral wire reinforcement are placed between the wire braids. Tests show that asbestos fabric serves to a better advantage on the larger hose sizes, since the asbestos is a slow conductor of heat and when combined in this construction will prolong the life of the hose. Use of a spiral reinforcement prevents, to a marked degree, collapse and kinking when the hose is flexed or moved by means of a sling or some similar device. On hose sizes 1-in. and under a braided asbestos fabric is used. The improved steam hose is designed for saturated steam pressures up to 200 p.s.i. or super-heated steam up to 390 deg. F. It is available in a range of sizes from ⅜-in. to 2½-in.

Rotary Dry Blender and Mixer

PATTERSON FOUNDRY & MACHINERY CO., East Liverpool, Ohio, has announced what is known as the triplex dry blender, employing a new principle of mixing and blending of dry materials.

Material fed to the blender at the left in the illustration enters a single helicoid screw flight fastened to the outer shell, traveling one-third the length of the blender, where it enters a double helicoid screw flight, thus being divided into two distinct streams. When the third compartment is reached. the material enters a triple helicoid screw flight and division into three distinct streams is accomplished.

Each of the three compartments of the outer cylinder is equipped with an individual scoop, which picks up one-third of the material and deposits it in the inner cylinder. Again it is divided into sections traveling left toward the starting point the length of one compartment, or one-third the length of the blender, where one stream is permitted to return to the outer cylinder and a double stream carried through the second compartment. Another stream is dropped at the end of the second compartment and the third near the feed end of the machine. The result is mechanical division in thirds, and because of geometric progression the mixing proceeds rapidly, four cycles causing eighty-one divisions or practically complete mixing. One cycle averages approximately 15 revolutions.

This equipment may be suitable for mixing sanded plaster mixes, dry concrete batches, etc.

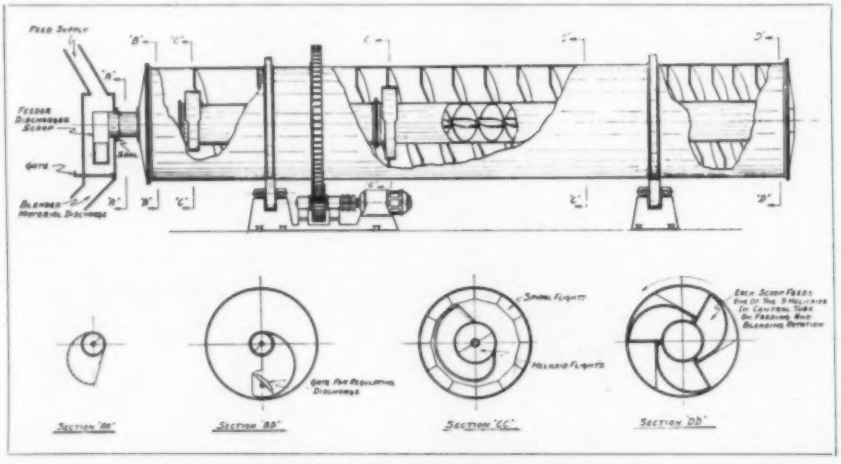
Concrete Brick Attachment For Power Stripper

STEARNS MANUFACTURING CO., Adrian, Mich., has announced a brick attachment for all Stearns power strippers

Brick attachment for power stripper

and for all Stearns Clipper strippers that have lever operated or power-operated strike-off.

The attachment consists of a mold box, tamp feet, hold-down assembly and compensating pallet support bars. It makes eight bricks on end at each operation, trowelling all four sides of each. Uniform density is said to be

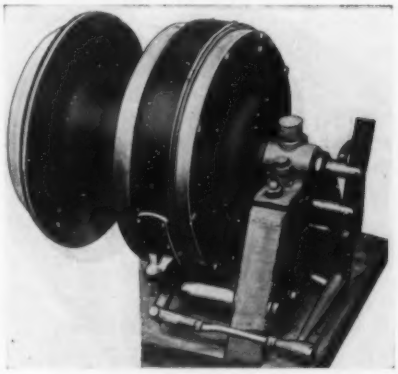


Cut-away sectional drawing showing how mixer operates

assured as there is an individual tamp rod for each brick. As brick are not cored units, plain wood or steel pallets may be used.

Hydraulic Clutch for Power Take-Off Units

FRAY-MERSHON, INC., Glendale, Calif., has developed a slow-speed, heavy duty hydraulic clutch which, it is said, makes



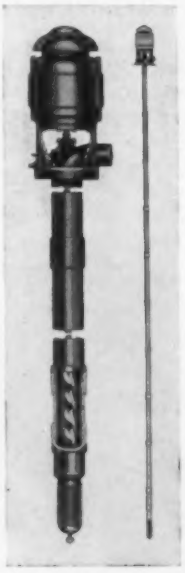
Clutch which is designed for operation of various types of power take-off units

it adaptable for operating conditions encountered in bulldozing and carry-all work and for use on winches and hoists.

The hydraulic clutch, which is self-energizing, operates entirely on oil and has no clutch plates or clutch lining. It is entirely enclosed, and is adaptable for remote control operation.

Pump for Small Drilled Deep Wells

PEERLESS PUMP DIVISION, Food Machinery Corp., Los Angeles, Calif., has developed a pump which is considerably different in design. It is neither a turbine pump nor a plunger pump but combines the advantages of both. Capacities start at 5 g.p.m., and pressures in excess of 500 lb. are obtainable. Maximum capacity is obtainable with the pump when used in connection with drilled deep well (as small as 3-in. in diameter) with lifts ranging from 40 ft. to 1000 ft. and with small variation in capacity or pressure, regardless of the height of the lift. The small pumping element is said to lift 50 gal. per minute 200 ft.



Lift pump of unusual design

Natural Gas Dynamite

HERCULES POWDER CO., Wilmington, Del., has announced that in collaboration with Purdue Research Foundation it has produced a natural gas "dynamite" which is to a limited extent a satisfactory substitute for nitroglycerin and other nitrated oils in commercial explosives. However, under present economic conditions the production of this new explosive for this purpose is not indicated. Newspaper reports had intimated that the discovery would revolutionize the production of explosives, and the Hercules company desired to dispel this impression.

Spraying Systems for Washing Aggregates

SPRAYING SYSTEMS CO., Chicago, Ill., has developed and placed on the market two types of spray nozzles, one known

Above: Flat jet type of spray nozzle. Below: Full jet type

as the "Flatjet" and the other as the "Fulljet." Both types are for use in washing crushed stone or gravel. The "Flatjet" provides a sharp, flat, hard-hitting spray which is available in sizes having capacities from 1 to 20 g.p.m. at 40 lb. pressure. The "Fulljet" ranges in capacity from 0.5 to 120 g.p.m. at 10 lb. pressure.

Snap-Action Limit Switch For Conveyors

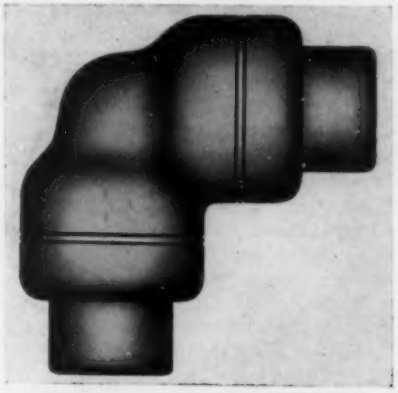
GENERAL ELECTRIC CO., Schenectady, N. Y., has designed a small, snap-action limit switch, CR9440-D2, so constructed that it can be easily mounted for operation in practically any position. The switch is enclosed in a die-cast case drilled to facilitate mounting on either back or side. Silver-to-silver, double-break contacts assure long life, while two independent circuits provide any contact arrangement. An over-center toggle mechanism provides the positive

Small switch that can be mounted in any position

snap-action. Either a roller-lever or push-rod head can be supplied for the switch.

Ball Bearing Swing Joints

CHIKSAN OIL TOOL CO., LTD., Fullerton, Calif., has designed two small joints which are said to be leak-proof and pressure-tight, and give full 360 deg. rotation without binding. Double rows of hardened steel ball bearings serve both to carry the radial load and to keep the packing element compressed



Leak-proof and pressure tight swing joints

by maintaining a pre-regulated thrust load upon it. These two recently developed swing joints are produced in ⅜-in. and ½-in. sizes. High pressure joints are of steel construction, tested to 4000 lb.; low pressure joints are made of brass or malleable iron, tested to 300 lb.

The swing joints are claimed to require no tightening, do not get out of adjustment, and, under ordinary circumstances, require no greasing after installation.

NEWS of the month

Immense Quantities of Aggregates for Shasta

THE BUREAU OF RECLAMATION will soon award the contract for 7,600,000 tons of gravel and 2,800,000 tons of sand to be used in the construction of Shasta dam in California. The aggregates will be obtained from two alternative sources to be selected by the government; one is the North Kutras tract on the Sacramento river east of Redding, 12 miles from the dam site; and the other is the Hatch tract on the Sacramento river in Tehama county. Washed and graded aggregates will be stock piled in five sizes. Maximum daily delivery is 16,000 tons of gravel and 6,000 tons of sand.

Ohio Company Under New Owners

OHIO SAND & GRAVEL CO., Columbus, Ohio, which is owned by Mrs. Fred S. Morrison, has been sold to Willis E. Miller, president of the William Miller Co., coal and builders supply firm at 1736 McKinley avenue, Columbus. The William Miller Co. also operates a sand and gravel plant at 1287 Jackson Pike, but the new deposit will provide an adequate source of masons' sand.

Open Kansas Plant

MADISON SAND AND GRAVEL CO., Madison, Kans., has opened up a new sand and gravel plant at Christiansens Point, Lake Madison. Modern screening and washing facilities have been installed by Edward Payne, owner, who will operate the plant with the assistance of his two sons, Edward, Jr., and Robert.

Cement Shortage Reported for Grand Coulee

CONCRETE is being poured at Grand Coulee dam nearly 100 percent in excess of maximum contract requirements, according to officials of the six Washington mills supplying the cement. The first schedule called for 220,000 bbls. in May, 200,000 bbl. in June, and 230,000 bbl. in July. Mills under contract actually delivered 360,000 bbl. in both May and June, and next month will be in excess of 350,000 bbl., but the contractors have been calling for 400,000 bbl. a month.

It is reported that the new call on bids for the second half of the year will be an additional supply of 130,000 bbl. in July; 420,000 bbl. a month during August, September and October; 380,000 bbl. in November, and 100,000 bbl. in December. All six mills are now operating at full capacity.

CONSOLIDATED BUILDERS, INC., the contractors, on May 25 broke the record for the amount of concrete poured in 24 hours with a total of 20,684 cu. yd. The previous record was 15,844 cu. yd. More than 1,500,000 cu. yd. of concrete have been placed under the high dam contract since February 2, 1938, and the contract calls for an additional 4,500,000 cu. yd.

Illinois Cement By Boat to Milwaukee

CEMENT MANUFACTURERS of the La Salle, Ill., district are planning to ship cement by barge via Illinois river, the drainage canal, Chicago river, and Lake Michigan to Milwaukee, Wis. The Illinois Freight Association held a public hearing recently in Chicago on a proposal to make a rate of 10c per 100 lb., to hold the all-rail handling of cement. The present rate is 13c per 100 lb.

Bituminous Rock Company Expansion Program

BITUMINOUS ROCK CO., Cincinnati, Ohio, a newly organized firm, is remodeling an old crushing plant at Big Clifty, Ky., for the production of rock asphalt. The company is also opening up a quarry at Hillsboro, Ohio, where a new plant to process bituminous limestone, containing a minimum of 2½ percent bitumen, is being built. As far as the property leases and plant equipment is concerned, the Hillsboro operation will be owned by the Bituminous Limestone Co., an Ohio corporation, but it will be operated by the Bituminous Rock Co., a Kentucky corporation. Both plants will be in operation by the middle of July.

Charlton Wilder is president of both companies; R. W. Sanders is sales manager; and D. W. Neff is engineer of tests and chief chemist. E. Lee Heidenreich, Jr., who was connected with the New York Trap Rock Corp. for many years, is the chief engineer of the companies and is the designer and builder of the new crushing and screening plants.

Lime Concern Expansion to Cost $250,000

M. J. GROVE LIME, Lime Kiln, Md., plans to build a new plant near Middletown, Va., comprising buildings for general production, kiln units, storage and distributing structures, power house and shop. An expenditure of approximately $250,000 will also include the development of a new quarry.

Silica Plant Improvements

CENTRAL SILICA CO., Glass Rock, Ohio, recently installed two 20- x 60-ft. Marietta concrete bins for the storage of dry silica sand. Haydite concrete staves were specified to obtain units having high thermal insulation qualities. Bins are equipped with tunnels at box car floor level so that a box car loader can be readily moved from bin to bins. Additional bins also are planned.

Removing Overburden at Rock Island Plant

ROCK ISLAND SAND & GRAVEL CO., Rock Island, Ill., is busy removing overburden preparatory to opening up its new sand and gravel plant at Milan, Ill., which will be started up this fall. A 60-hp. Caterpillar tractor is used in pulling a Le Tourneau scraper. For temporary operation

Above: Tractor and scraper for removing overburden. Below: Bulldozer pushes material into path of scraper bucket

until the plant is completed, the tractor equipped with a bulldozer pushes the sand and gravel material into the path of a ¾-cu. yd. Sauerman bucket, which carries it by means of a slackline cableway to the plant.

Cement Company to Make Rock Wool

CARNEY ROCK WOOL CO., Mankato, Minn., was recently incorporated and a plant will soon be erected. The new company is affiliated with the Carney Cement Co., and will be headed by H. E. Carney, Jr., president of the cement company. Other officers are: W. R. Oglesby, vice-president and chemist; Dean Brown, treasurer and general manager; and Ira Nelson, secretary and sales manager. C. V. McKinney, formerly connected with the Norge Corp., will serve as plant superintendent and company engineer. The plant will be located near the Carney company quarries, and will cost about $25,000.

Largest Cement Order Placed with Non-Producer

DROPPED LIKE A BOMB SHELL in the troubled waters of the cement industry, the placing of the huge federal Shasta dam contract for 5,880,000 bbl. of cement with The Permanente Corporation, San Francisco, Calif., is probably one of the most unusual situations in the industry's history. While not entirely unexpected, the decision to place the order with a company which at the time of the award did not have more than the plans for a plant on paper is of unusual significance.

The Permanente company's bid was $1.19 a bbl. at the mill, which is to be located in Santa Clara county, Calif., but transportation and other items would make the price $1.90 per bbl., f.o.b. job, for a total of $11,025,892.80. Delivery is to be made during the calendar years 1940 to 1944. Government officials rejected a bid of $2.10 plus per bbl., by the Portland Cement Institute, representing a joint offer from Beaver Portland Cement Co., Calavaris Cement Co., Monolith Portland Cement Co., Pacific Portland Cement Co., Santa Cruz Portland Cement Co., and Yosemite Portland Cement Co. Bureau of Reclamation officials reported that the Institute, after the award had been made, had offered to provide the cement at a cheaper price if the Bureau would turn down the Permanente contract. This offer was rejected. Henry J. Kaiser, Oakland, Calif., contractor for Boulder dam, Grand Coulee and other large projects, with local interests in the San Francisco Bay region is financing the new cement plant.

Secretary of the Interior Harold L. Ickes vigorously defended the award to the Permanente company as a blow against "collusive bidding" by other concerns on federal projects. The award for the largest cement order ever placed was made under a ruling by the comptroller general that the firm headed by Henry J. Kaiser was eligible for a contract despite the fact it has not yet constructed its plant. The bid was about $1,500,000 less than the bid of the other companies.

Considerable speculation has been aroused as to what may happen when the government calls for competitive bids to be asked on June 16 for several million barrels of cement for Grand Coulee dam.

Simplified Specifications for Aggregates

ANNOUNCEMENT has been made by the National Bureau of Standards that Simplified Practice Recommendation R163-36, covering crushed stone, gravel and slag, has been accorded the required degree of acceptance by the industry. The two original groups of sizes has been consolidated into one, eliminating 12 sizes. The revision, like the original, comprises primary sizes and their combinations or modifications, but closer tolerances have been fixed for the lower limits of each size; a five percent limit having been placed on a size smaller than the nominal minimum to further control the amount of fine material. One size was added to meet a growing demand for fine seal construction for surface treatment of airports.

Quarry Safety Awards

INLAND LIME & STONE CO., Manistique, Mich., was the 1938 winner of the Bureau of Mines national safety competition in the quarry group and was awarded one of the Sentinels of Safety trophies donated by the Explosives Engineer magazine. This quarry worked 299,751 man-hours in 206 days without a lost-time accident.

More Research in Sand

(Continued from page 47)

industrial sand industry. He commented particularly on the status of the National Labor Relations Act, the Fair Labor Standards Act and other statutes of direct interest and voiced the general opinion in Washington on the presidential possibilities for 1940, the possibilities of war and its effect on industry, the national budget and other matters of general interest.

He said that the present national budget is likely to be continued, since the only real solution to decreasing the national debt is by wiping out subsidies, grants and aids. The social security legislation in his opinion is permanent law. A proposed amendment to the Federal Wage and Hour Law would give the administrator the power to decide on all cases.

In his opinion relief will continue to be governed by the federal government and there is likely to be a new spending-lending federal program. In voicing his opinion as to the possible effect of a change of party in Washington, Mr. Ahearn said there would be very little change in the present legislative setup.

There was some discussion of the industry's qualifications as a seasonal industry under the Fair Labor Standards Act, and it was pointed out that several member companies in certain geographical locations were "seasonal" in that raw materials were unproducable at certain periods of the year when shipments had to be made from the stockpiles.

The entire third day of the convention was set aside for golf and a luncheon party for the delegates and their wives with the South Jersey group as hosts. Arrangements for a gala outing were made by Merrill Taggart of Taggart and Co., Philadelphia, Penn.

Wider Market for Crushed Stone

SOME practical approaches toward a larger market for crushed stone were outlined at the monthly business meeting of the New York Crushed Stone Association held on May 26 at the Commodore Hotel, New York, N. Y. President H. E. Coleman presided.

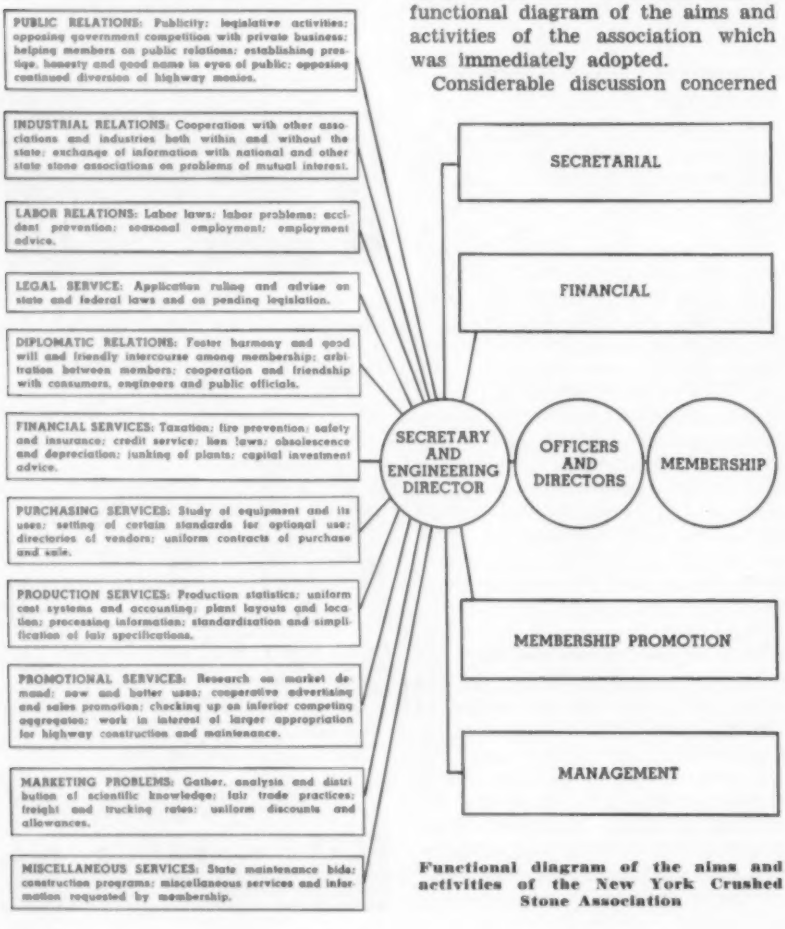
E. T. Nettleton, the new secretary and engineering director, has embarked upon an ambitious program to enlarge the activities of the association. Proposed legislation in Albany and in Washington and possible changes in existing laws pertinent to crushed stone were discussed by Mr. Nettleton. In addition to his regular duties, Mr. Nettleton worked up and submitted to this meeting a functional diagram of the aims and activities of the association which was immediately adopted.

Considerable discussion concerned the diversion of highway funds in New York State, which is abnormally high; W.P.A. competition, where such activity is unjustified on the basis of competitive costs of production; and the possibilities of enactment of a state sales tax. The Association went on record as favoring the latter, since funds are short in New York State and such action might eventually lead to the return of gasoline tax and license tag monies to the highways for which purpose they were levied in the first place.

One producer mentioned bids released in his territory which specified on a volumetric basis stone weighing 2500 lb. per cu. yd. or iron ore tailings at 2700 lb. per cu. yd., without regard to the actual weights which do exist. The point raised was that the figures specified were arbitrary—that the stone actually weighed less and the tailings more—and that for future specifications those figures should be corrected. Another producer mentioned the opening of W.P.A. quarries where costs of production were entirely too high to warrant such action. A third suggested that an effort be made to standardize architects' specifications for school driveways, parking lots and the like. Action on these and other matters was deferred to the secretary and engineering director.

Another producer mentioned how well pleased the New Jersey State Highway Department was with roads built with an 8- to 10-in. thickness of crushed stone as a base under a 10-in. concrete slab. Stone used is 1¼- to 3-in. with screenings as a binder. This construction was designed not only for use on unstable subsoil but for heavy traffic. It was suggested that a subbase of this kind would possibly reduce reinforcing and expansion joint costs and maintenance on the concrete slab, which would justify its use on a broader scale.

Before adjourning, all members stood in silence for one minute in respect to Frank Owens, a beloved member who had recently passed away.



Functional diagram of the aims and activities of the New York Crushed Stone Association

Obituaries

CHARLES E. SCHNEIDER, former sand and gravel dealer in Milwaukee, Wis., died May 24 after a year's illness. He was 75 years of age.

•

MISS MARIE H. SMITH, secretary of the Economy Concrete Block Co., Wauwatosa, Wis., died June 11 at the age of 50.

•

M. TRAZNICK, Cary, Ill., sand and gravel plant operator, died May 22. His son, Edward Traznick, will continue the business.

•

ROBERT KELBURNE PRESTON, president of the Preston Mica Co., died at his home in Evanston, Ill., on May 25, at the age of 80. Mr. Preston was born in Cottingham, England, settled in the Canadian Northwest, came to the United States in 1900, living in Valparaiso, and then moved to Chicago in 1901. Shortly after this Mr. Preston became head of the Preston Mica Co., which he guided for 32 years.

•

D. M. BOWERS, vice-president and director of the McLain Sand Co., Point Marion, Penn., died May 14. He was 77 years of age. Mr. Bowers was also active in civic affairs, having served as a member of the borough council for 24 years and on the board of education for six years.

•

E. H. FROMM, manager of the cement division of Babcock & Wilcox Co., New York City, died May 24 following a major operation. He joined the services of Babcock & Wilcox when that company took over the Fuller-Lehigh Co., makers of the Fuller mill.

•

DR. ALEXANDER HASSELBACH, president and member of the executive board of G. Polysius, A. G., Dessau, Germany, died June 3.

•

WILLIAM R. ANDERSON, vice-president and general manager of the Ash Grove Lime and Portland Cement Co,. Kansas City, Mo., died June 11. He was 51 years of age. A native of Missouri, born in Montrose, Mr. Anderson had been with the Ash Grove company more than twenty years.

•

MARIANO DEMAGISTRIS, president of the Providence Crushed Stone & Sand Co., Inc., Providence, R. I., died June 13 at the age of 76. He came to the United States from Italy in 1890 and five years later entered the road construction and crushed stone business.

J. B. ADAMS, board chairman of the Longview-Saginaw Lime Works, Inc., Birmingham, Ala., died June 14, after a long illness. He was practically the founder of the Longview-Saginaw company, other than a few years his father was with the company, and when he died he rounded out a service of more than 50 years.

Prices Bid—Contracts

NEWARK, OHIO: Black Top Road and Driveway Co., Newark, has been directed to supply 100 tons of "cold mix" for county road repair at $4.25 per ton.

•

MCCONNELSVILLE, OHIO: Muskingum Valley Asphalt & Supply Co., Zanesville, Ohio, was awarded contract for the asphaltic concrete for the surfacing of the streets, at a price of $5.75 per ton. The minimum amount of contract called for is 1550 tons and the maximum is 3500 tons, dependent upon the 1939 WPA program in this village.

•

MARSEILLES, ILL.: Arb Sandusky, Marseilles, was awarded the contract for 5034 cu. yd. of gravel to be used on a WPA road job at 59c per cu. yd.

•

FT. WAYNE, IND.: Contracts have been let for 16,000 tons of coarse stone or gravel aggregate to be used in improving Allen County roads. The successful bidders were as follows, the figures in each instance being the price per cu. yd.: Erie Stone Co., Lower Huntington Road, $1.40; Hayden Road, $1.60; Paulding Road (west end), $1.49; Winchester Road, $1.44; John Kauser, Paulding Road (east end) $1.25; J. C. O'Connor and Sons, Hayden, $1.55 on size No. 8 material only; Ray Irving, Holton Road, $1.70; and Hessler Road, $1.73. All of these prices are on the basis of material being spread on the roads.

•

OSWEGO, N. Y.: Solvay Sales Corp., and the General Crushed Stone Co., both of Syracuse, submitted bids for providing up to 500 tons of crushed stone for paving purposes at $1.90 per ton, delivered by truck on the job. The Solvay Co. also bid $1.55 a ton on cars at the department of public works siding, the lowest price at which crushed stone has been sold in Oswego in a number of years.

•

MOUNT VERNON, N. Y.: Contract has been awarded to Willson and Adams to supply 400 bbl. of quick-setting cement for a WPA project, on a bid of $2.80 per bbl.

FINANCIAL NOTES

RECENT DIVIDENDS ANNOUNCED

Alpha Portland Cem.....	$.25	Sept. 25
Arundel Corp.	.25	July 1
Calaveras Cem. Co., pfd..	1.00	June 30
Kelley Island Lime & Tr.	.25	June 30
Lehigh Portland Cem....	.37½	Aug. 1
Missouri Portland Cem..	.50	June 30
Santa Cruz Portland Cem.	.50	July 1
Schumacher Wall Board Corp., pfd.	.50	Aug. 15
Superior Portland Cem., Cl. A	.62½	July 1
Superior Portland Cem., Cl. B	.50	July 15
Yosemite Portland Cem., pfd.	.10	July 1

DEWEY PORTLAND CEMENT CO., Kansas City, Mo., reported a net income of $59,483 for the three months ended March 31, 1939, and for the year ended December 31, 1938, a net income of $776,810. Net sales for the first quarter were $441,054, and for the year ended December 31, 1938 they were $3,158,028.

•

CONSOLIDATED SAND & GRAVEL CO., subsidiary of Standard Paving & Materials, Ltd., Toronto, Canada showed a net loss of $5620 for the year ended March 31, 1939 compared with a net profit of $111,663 for the same period a year ago.

•

MICHIGAN SILICA CO., Rockwood, Mich., had a net profit of $10,247 for the three months ended March 31, 1939 as compared with a net profit of $1,655 for the first quarter a year ago. Sales for the first quarter this year were $22,456, a substantial gain over the same quarter a year ago when they amounted to $14,887.

•

KELLEY ISLAND LIME & TRANSPORT CO., Cleveland, Ohio, had a net profit of $239,806 for the year ended December 31, 1938. This compares with a profit of $484,588 for the same period ended December 31, 1937. Net sales as reported to the SEC were $2,841,642 in 1938 as against $3,838,948 in 1937. Profits from boat operation were $68,308 in 1938 as compared with $66,623 in 1937.

•

ARUNDEL CORP., Baltimore, Md., has reported to the SEC a net income of $1,007,783 for the year ended December 31, 1938, after federal income taxes.

•

BASIC DOLOMITE, INC., Cleveland, Ohio, had net sales of $1,484,710 for the year ended December 31, 1938, according to a report filed with SEC. Sales in 1937 totaled $2,022,134. The cost of sales in 1938 was $1,165,007 as compared with $1,355,354.

•

NEW YORK TRAP ROCK CORP., New York, N. Y., has offered to purchase $600,000 of its first mortgage six percent bonds through Smith, Barney & Co., New York, N. Y. All bonds tendered must have attached all coupons, and participation warrants in the case of stamped bonds, maturing December 1, 1939, and subsequently. Coupons and participation warrants due June 1, 1939, should be detached and presented for payment in the usual manner.

•

PACIFIC PORTLAND CEMENT CO., San Francisco, Calif., reports for the five months ended May 31, 1939, that

cement sales were up 35 percent and plaster sales up 36 percent over the like period a year ago. The company is now operating seven of its ten plants, the Redwood City, Calif. plant running at about 70 percent of capacity. The present administration headed by William F. Humphrey as chairman of the board was returned to control of the company at the last stockholder's election.

•

CELOTEX CORPORATION, Chicago, Ill., has announced a net profit for May of $159,800, after charges and taxes, compared with $69,691 a year ago. Bror Dahlberg, president of the company, said that the improvement reflected the current upturn in building operations. This company controls Certain-Teed Corp., makers of gypsum products, which showed a net profit of approximately $61,000, against $18,129 for the same month a year ago.

•

PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., is making further revisions in its capital structure. The company has dissolved its subsidiary, Golden Gate-Atlas Materials Co., in which 98 percent of the outstanding stock was owned. All the assets of the company have been acquired by Pacific Coast Aggregates for $42,895, and all debts and liabilities of the former subsidiary have been assumed. The latest move is said to be another step toward a simpler capital set-up. A reduction in stated capital of $2,714,366 was effected by vote of stockholders last year.

•

HERMAN SILICA SAND CO., Herman, Mo., has offered for sale 100 shares of its unissued 6 percent preferred stock at $100. It is planned to use the funds for electrification of the plant and for additional storage capacity.

Install Concrete Bins

RIVER SAND AND GRAVEL CO., Owensburg, Ky., has installed two 18- x 40-ft. Marietta concrete bins for storing concrete aggregates. Several additional bins and an improved conveying system are contemplated. This is said to be the first step in thoroughly modernizing this Ohio river plant.

OHIO AGRICULTURAL Experiment Station has been working for the past two years on methods of growing greenhouse plants in gravel cultures with nutrient solutions. No soil is used, the bed being made up of gravel.

Ready-Mix Directors Discuss Registration and Standards

NATIONAL READY-MIXED Concrete Association, board of directors, met at the New Yorker hotel, New York City, on June 6, for its semi-annual meeting. Joseph Dixey, vice-president, was chairman in the absence of James McCracken, president, who is convalescing from a recent serious illness. Mr. McCracken's many friends in the industry will be grateful to know that he will soon be back in harness after an emergency appendicitis operation. All other members were present with the exception of two.

Among the matters taken up were membership and budget, the convention program for 1939 at St. Louis, Mo., a discussion of standards led by Stanton Walker, engineering director, who is a very active member of the committee on standards, and Vincent Ahearn's interpretation of some of the important, but little understood, provisions of recent federal legislation.

In discussing finances and membership it was revealed that the Association, while it numbers less than 100 members, does represent over 60 percent of the national ready-mixed concrete production. A suggestion, by one of the representatives of truck mixer equipment, to increase space rates for display of machinery at the annual conventions was ruled out because of the decline in output of ready-mixed concrete. The suggested increase was volunteered in the interest of improving the Association's financial standing.

There was some discussion on the advisability of exhibiting machinery at each annual convention, since recently a couple of manufacturers of aggregates equipment had openly doubted the value of exhibiting annually. Representatives of machinery manufacturers at the meeting wholeheartedly endorsed the annual exhibits and agreed that such displays had been of infinite value to them. Producer members unanimously agreed that the machinery exhibits are a drawing attraction for the conventions and that their presence is absolutely necessary to the convention's success. It was generally agreed that, in an industry as young as ready-mixed concrete, there are continual improvements in methods and equipment which rightfully should be made available for presentation to producers of ready-mixed concrete. In analyzing the objections of the concerns which thought they were getting insufficient returns from annual exhibits, the members present were in accord that even if there are no particularly new developments in equipment it is advisable to keep modern equipment constantly before the prospective customer.

Changes in the standards for open top mixers, previously submitted to the members, were voted as a tentative standard. Considerable discussion revolved about the suggestion of changing standards for drum mixers, particularly in regard to charging capacity and the number of revolutions of the drum. These changes were brought up in order to arrive at fair standards to include one of the newer-type drum mixers now on the market. The change, over which there was considerable controversy, was relative to increasing the charging limits on a given mixer, which now is 57.5 percent in the present standards. The discussion was most interesting but did not develop a definite decision.

Mr. Ahearn confined his remarks to the Walsh-Healey Law and the wage-hour law, and placed emphasis on some features which are likely to be misunderstood or overlooked. Under provisions of the Walsh-Healey Law, he cautioned that while subcontractors relieve the producer of liability for compliance, owner-operators hired as sub-contractors on a given federal contract do not discharge the producer of blame in event of failure to comply with provisions of the law.

Lion Gardiner and H. Thomson, who had attended the recent convention of the American Concrete Institute, told of the invitation by that organization to have the ready-mixed concrete industry represented on its next convention program. It was decided that Mr. Thomson prepare one paper for presentation at that meeting, and other speakers will be selected at a later date.

Fire Damages Property at Quarry

NEW YORK TRAP ROCK CORP., New York, N. Y., suffered a considerable loss from a fire which swept through its Cedarcliff plant. The fire started on the West Shore railroad trestle, according to news reports, and then spread to the stone plant.

Cement Plants Resume After Coal Tie-Up

REPORTS coming from the eastern states indicate that production has been stepped up to take up the lag caused by the shut-downs resulting from the recently settled coal strike.

•

EDISON PORTLAND CEMENT CO., Stewartsville, N. J., resumed operation after a short shut-down occasioned by the coal strike.

•

NORTH AMERICAN CEMENT CORP., Security, Md., recently started up operations after its coal supply had been restored. About 100 men were back on the job. The plant at Alsen, N. Y., also started up late in May.

•

MEDUSA PORTLAND CEMENT CO., Bay Bridge, Ohio, opened for operation on June 1. The plant was originally scheduled for resumption of operations on May 1, but lack of sufficient coal prevented reopening until a month later.

•

LEHIGH PORTLAND CEMENT CO., New Castle, Penn., recalled its men to work on June 19. According to Wesley Davy, superintendent, the plant will be on a seven-day, 24-hour schedule with each employe working a six-hour shift, six days a week.

•

WABASH PORTLAND CEMENT CO., Stroh, Ind., opened June 1 for repairs and conditioning of machinery preparatory to the resumption of production the following week.

Sand and Gravel Shorts

Vincent Spencer Sand & Gravel Co., Belvidere, Ill., has a new plant at Harvard, Ill., which is in process of construction.

•

The Daily Chemical Laboratories, Oroville, Calif., has purchased property in Thermalito for the erection of a new plant to process the black sand found in this area. Franklin and Geo. E. Dailey are the operators and owners of the plant.

•

W. B. Tull, Silsbee, Texas, has made application to dredge the Neches river from Evadale to Town Bluff for the purpose of sand recovery.

•

The Hartland Washed Sand and Gravel Co., Verona, Wis., has established a new plant at Wyocena, Wis.

•

A gravel deposit at Whiskey Chute, five miles northeast of Lake Village, Little Rock, Ark., is now being oper-

ated. About 10 carloads a day are to be shipped out. The deposit is said to contain 400,000 tons of material.

•

Ohio River Sand and Gravel Corp., Wheeling, W. Va., has rebuilt its dredge boat, which was seriously damaged by fire several months ago. A new 165-hp. Diesel engine was installed.

•

Battle Creek, Mich., has advertised for bids to build a sand and gravel plant for the city to supply gravel from city-owned pits. It is estimated that the plant will cost from $9000 to $10,000.

Sand-Gravel Production In 1938

PRODUCTION of sand and gravel in the United States during 1938 decreased four percent in tonnage and 12 percent in value with an output of 181,320,000 short tons valued at $85,922,847, compared with 189,660,423 tons valued at $97,472,997 in 1937. According to the latest Bureau of Mines report, contractors and construction or highway maintenance crews employed by federal, state, county or municipal governments accounted for two-fifths of the total output compared with one-third of the total in 1937. More than three-fifths of the material used on federal projects was produced by WPA crews.

Sales by commercial producers amounted to 105,759,786 short tons valued at $65,015,878 in 1938, a decrease of 16 percent in tonnage and 18 percent in value from 125,015,878 tons valued at $79,114,318 in 1937. Building sand decreased 12 percent with an output of 22,939,000 tons in 1938 and 26,050,459 tons in 1937. Paving sand dropped to 16,755,634 tons, a decrease of 4 percent from the 1937 figure of 17,395,013 tons. Approximately 92,825,363 tons, or 88 percent of the commercial output, were reported as washed or screened material, with an average value of 66c per ton compared with 29c for unprepared sand and gravel.

With an increase of 17 percent, sand and gravel produced by non-commercial operators in 1938 amounted to 75,560,447 short tons, compared with 64,317,945 tons in 1937. Average value was 28c per ton.

Cement Production Continues Upward

FIGURES released on June 14 by the Bureau of Mines show that in April, 1939, the portland cement industry produced 9,674,000 bbl., shipped 9,654,000 bbl. from the mills, and had in stock at the end of the month 23,806,000 bbl. Production and shipments in April, 1939, showed increases of 21.2 and 11.1 percent, respectively, as compared with April, 1938. Portland cement stocks at mills were 6.9 percent higher than a year ago.

The mill value of the shipments, 19,151,000 bbl., in the first quarter of 1939 is estimated as $28,168,000. Reports of producers indicate that for the quarter shipments included approximately 818,000 bbl. of high-early-strength portland cement with an estimated mill value of $1,528,000.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 161 plants at the close of April, 1938 and 1939.

RATION (PERCENT) OF PRODUCTION TO CAPACITY

	Apr. 1938	Mar. 1939	Feb. 1939	Jan. 1939
The Month	37.7	45.7	37.4	27.9	24.3
12 Months	41.8	43.5	42.8	41.9	41.3

•

B. & M. Quarry, Ottumwa, Iowa, is also going into the sand and gravel business. Ben Ravitz, president, announces that the sand and gravel plant will be in the immediate vicinity of Ottumwa.

Eastern Sand Producers Water Carrier Status

NATIONAL SAND AND GRAVEL ASSOCIATION held a meeting at the New Yorker hotel, New York City, June 5, with interpretive bulletin No. 11 recently issued in connection with federal wage and hour legislation as the principal topic of conversation. Practically all eastern seaboard producers of sand and gravel who operate dredge equipment or transport their products by the navigable waters were there, as were a number of representatives of water carrier groups and two producers of crushed stone who transport their stone by barge and steamer. The entire meeting was concerned with the definition of "seaman" and how in individual cases such employes are to be handled in a proper interpretation of the law. From the cases cited at the meeting, it is very evident that the duties of men working on navigable waterways and their living conditions present a veritable maze of definitions and interpretation. Vincent Ahearn, executive secretary of the Association led the discussion from the floor.

Since this meeting, the Association has filed a formal protest with Administrator Andrews against his ruling covering seamen.

Sand-Lime Brick Production Shipments

SEVEN active sand-lime brick plants reporting for May and seven for April, statistics for which were published in June.

AVERAGE PRICE FOR MAY

	Plant Price	Delivered Price
Detroit, Mich.	....	$16.00
Milwaukee, Wis.	$10.00	12.50
Mishawaka, Ind.	11.00	....
St. Louis Park, Minn.	8.00	9.50
Syracuse, N. Y.	14.00	16.00 C/L 20.00 L/C

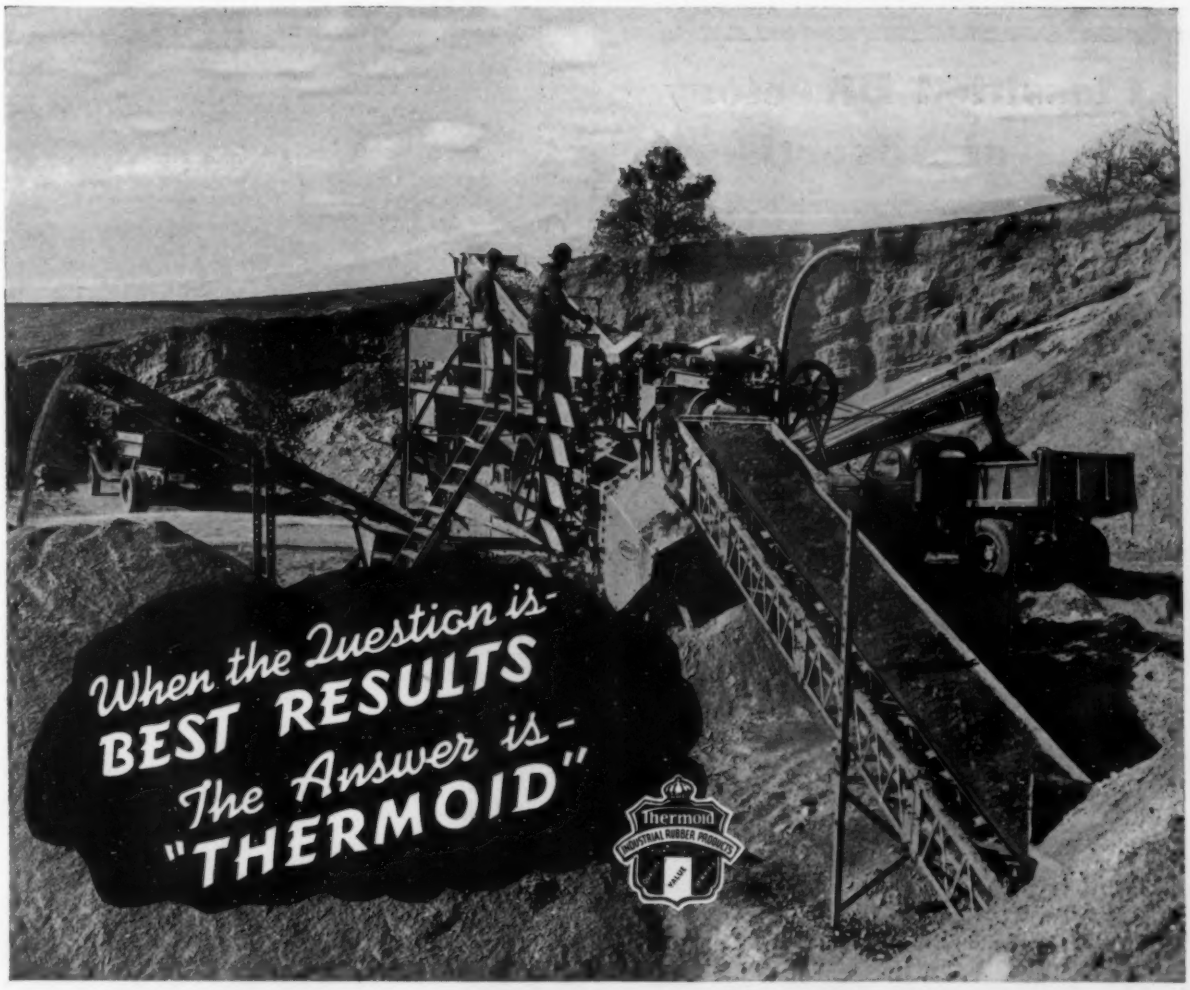
STATISTICS FOR APRIL AND MAY

	April	May
Production	1,147,250	1,936,525
Shipments (rail)	105,000	257,000
Shipments (truck)	1,364,477	2,148,080
Stock on hand	530,043	436,479
Unfilled orders	1,917,294	1,860,000

Concrete Pavement Yardage

AWARDS of concrete pavement for May, 1939, have been announced by the Portland Cement Association as follows:

Type of construction	Sq. yds. awarded during May	Total sq. yds. during first five months
Roads	2,178,970	7,890,847
Streets & Alleys	2,279,508	6,531,400
Airports	.....	195,563
Totals	4,458,478	14,617,810



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Steam Hose
Tank Truck Hose
Gasoline Hose
Suction Hose

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Classified Directory of Advertisers

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Frog, Switch & Mfg. Co.

Abrasives
Wall-Colmonoy Corp.

Aerial Tramways
American Cable Co.
American Steel & Wire Co.
Columbia Steel Co. (U.S. Steel Corp. Subsidiary)
Hazard Wire Rope Co.
Jeffrey Mfg. Co.
Leschen, A. & Sons Rope Co.
Link Belt Co.
MacWhyte Co.
Roebling's, John A., Sons Co.

Agitators
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Hardinge Co.
Hetherington & Berner, Inc.
Ransome Concrete Machy. Co.
Smidth, F. L. & Co.
Traylor Engineering & Mfg. Co.

Air Compressors
Allis-Chalmers Mfg. Co.
Fuller Company
Norberg Mfg. Co.
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Traylor Engr. & Mfg. Co.

Air Filters
Blaw-Knox Co.
Fuller Company
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Northern Blower Co.
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Air Separators
Blaw-Knox Co.
Combustion Engr. Corp.
Gay, Robert M. Div.
Hardinge Co., Inc.
Link-Belt Co.
Northern Blower Co.
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Smidth, F. L., & Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

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Fuller Company

Alloys (Metal)
Chicago Steel Foundry Co.
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Wall-Colmonoy Corp.

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General Electric Co.

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Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.
Robins Conveying Belt Co.

Asphalt Mixer Regulators
Hetherington & Berner, Inc.

Asphalt Mixing Plants
Hetherington & Berner, Inc.
Koehring Co.
Ransome Concrete Machy. Co.
Traylor Engr. & Mfg. Co.

Axles
Eagle Iron Works

Babbit Metal
Allis-Chalmers Mfg. Co.
Dixie Machy. Mfg. Co.
Ryerson, Jos. T. & Sons, Inc.

Backdiggers
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Link-Belt Co.

Backfillers
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.

Bag Cleaning Machines
Link-Belt Co.
Northern Blower Co.

Bagging Machines
Smidth, F. L., & Co.

Bag Ties
American Steel & Wire Co. (U.S. Steel Corp. Subsidiary)
Columbia Steel Co. (U.S. Steel Corp. Subsidiary)
Wickwire-Spencer Steel Co.

Balers or Bundling Machines (Sack)
Besser Mfg. Co.

Balls (Grinding)
Allis-Chalmers Mfg. Co.
Columbia Steel Co. (U.S. Steel Corp. Subsidiary)
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.
Straub Mfg. Co.
Traylor Engr. & Mfg. Co.

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Ransome Concrete Machy. Co.

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Eagle Iron Works

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Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Fuller Company
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Ransome Concrete Machinery Co.

Batteries
Goodyear Tire & Rubber Co.

Battery Chargers
General Electric Co.

Bearings (Anti-Friction)
Chain Belt Co.
Eagle Iron Works
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.
Timken Roller Bearing Co.

Bearing Metals
Allis-Chalmers Mfg. Co.
Robins Conveying Belt Co.

Bearings (Roller)
Flexible Steel Lacing Co.
Link-Belt Co.
Robins Conveying Belt Co.
Timken Roller Bearing Co.

Bearings (Tapered Roller)
Link-Belt Co.
Timken Roller Bearing Co.

Bearings (Thrust)
Timken Roller Bearing Co.

Belt Cutting Machines
Flexible Steel Lacing Co.

Belt Fasteners or Hooks
Flexible Steel Lacing Co.
Robins Conveying Co.

Belt Idlers
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Smith Engr. Works

Belting (Chain)
Chain Belt Co.

Belting (Conveyor & Elevator)
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Chain Belt Co.
Goodyear Tire & Rubber Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveyor Belt Co.
Thermoid Rubber Co.

Belting Metal
Wickwire-Spencer Steel Corp.

Belting (Transmission)
Bacon, Earle C., Inc.
Chain Belt Co.
Goodyear Tire & Rubber Co., Inc.
Link-Belt Co.
Smidth, F. L., & Co.
Thermoid Rubber Co.

Belting (V-Type)
Allis-Chalmers Mfg. Co.
Goodyear Tire & Rubber Co., Inc.
Thermoid Rubber Co.

Belting (Wire)
Wickwire-Spencer Steel Co.

Belt Lacing
Flexible Steel Lacing Co.

Belt Tighteners
Link-Belt Co.
Robins Conveying Belt Co.

Belt Trippers
Bacon, Earle C., Inc.
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Bin Gates
Allis-Chalmers Mfg. Co.
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Bacon, Earle C., Inc.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Diamond Iron Works
Eagle Iron Works
Fuller Company
Gay, Rubert M. Div.
Hardinge Co., Inc.
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jaeger Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Northern Blower Co.
Pioneer Engr. Works, Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Smith Engr. Works
Traylor Engr. & Mfg. Co.
Universal Road Machinery Co.

Bins (Storage)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Gay, Rubert M. Div.
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Link-Belt Co.
McLanahan & Stone Corp.
Northern Blower Corp.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Rogers Iron Wks. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.

Bin Indicators
Fuller Company
Merrick Scale Mfg. Co.

Blasting Caps
Du Pont, E. I., de Nemours, & Co., Inc.

Blasting Cap Crimpers
Ensign-Bickford Co.

Blasting Machines
Du Pont, E. I. de Nemours & Co., Inc.

Blasting Supplies
Du Pont, E. I., de Nemours & Co.
Ensign-Bickford Co.

Block Machines, Building (Concrete)
Anchor Concrete Machinery Co.
Besser Mfg. Co.
Multiplex Concrete Machy. Co.

Blocks (Pillow)
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Timken Roller Bearing Co.

Blocks (Sheave)
American Hoist & Derrick Co.
Link-Belt Co.
Pioneer Engineering Works
Roebling's, John A., Sons
Sauerman Bros., Inc.

Blowers
Allis-Chalmers Mfg. Co. Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.

Boats (Self-Unloading)
Link-Belt Co.
Robins Conveying Belt Co.

Boilers
American Hoist & Derrick Co.
Combustion Engineering Co.

Bond Wire
American Steel & Wire Co. (U.S. Steel Corp. Subsidiary)
Columbia Steel Co. (U.S. Steel Corp. Subsidiary)

Brick Machines and Molds
Besser Mfg. Co.
Multiplex Concrete Machy. Co.

Buckets (Clamshell, Crab and Orange Peel)
Blaw-Knox Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Hayward Co.
Industrial Brownhoist Corp.
Jaeger Machine Co.
Link-Belt Co.
Robins Conveying Belt Co.

Buckets (Conveyor & Elevator)
Allis-Chalmers Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Chicago Steel Foundry Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Works
Ransome Concrete Machy. Co.
Robins Conveyng Belt Co.
Smidth, F. L., & Co.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Universal Crusher Co.

Buckets (Dragline & Slackline)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Hayward Co.
Hendrick Mfg. Co.
Link-Belt Co.
Pioneer Engineering Works
Sauerman Bros., Inc.

Buckets (Dredge & Excavator)
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co.
Hendrick Mfg. Co.

Buckets (Dump)
Dempster Bros., Inc.
Jaeger Machine Co.

Buckets (Tramway)
American Steel & Wire Co. (U.S. Steel Corp. Sub.)
Columbia Steel Co. (U.S. Steel Corp. Subsidiary)

Building Tile Machines
Besser Mfg. Co.
Multiplex Concrete Machy. Co.

Bulk Cement Batching Plants
Heltzel Steel Form & Iron Co.

Bulk Cement Storage Plants
Blaw-Knox Co.
Heltzel Steel Form & Iron Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

Bulldozers
Blaw-Knox Co.
Bucyrus-Erie Co.
Koehring Co.

Bullscrapers
Bucyrus-Erie Co.

Bushings
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.

Cables (Electric)
General Electric Co.

Cableways
American Cable Co.
American Steel & Wire Co. (U.S. Steel Corp. Sub.)
Blaw-Knox Co.
Bucyrus-Erie Co.
Columbia Steel Co. (U.S. Steel Corp. Sub.)
Hazard Wire Rope Co.
Leschen, A., & Sons, Rope Co.
Link-Belt Co.
Macwhyte Co.
Roebling's, John A., Sons Co.
Sauerman Bros., Inc.
Wickwire-Spencer Steel Co.

Calcining Equipment
Allis-Chalmers Co.
Blaw-Knox Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Calcium Chloride
Du Pont, E. I., de Nemours & Co.

Capacitators
General Electric Co.

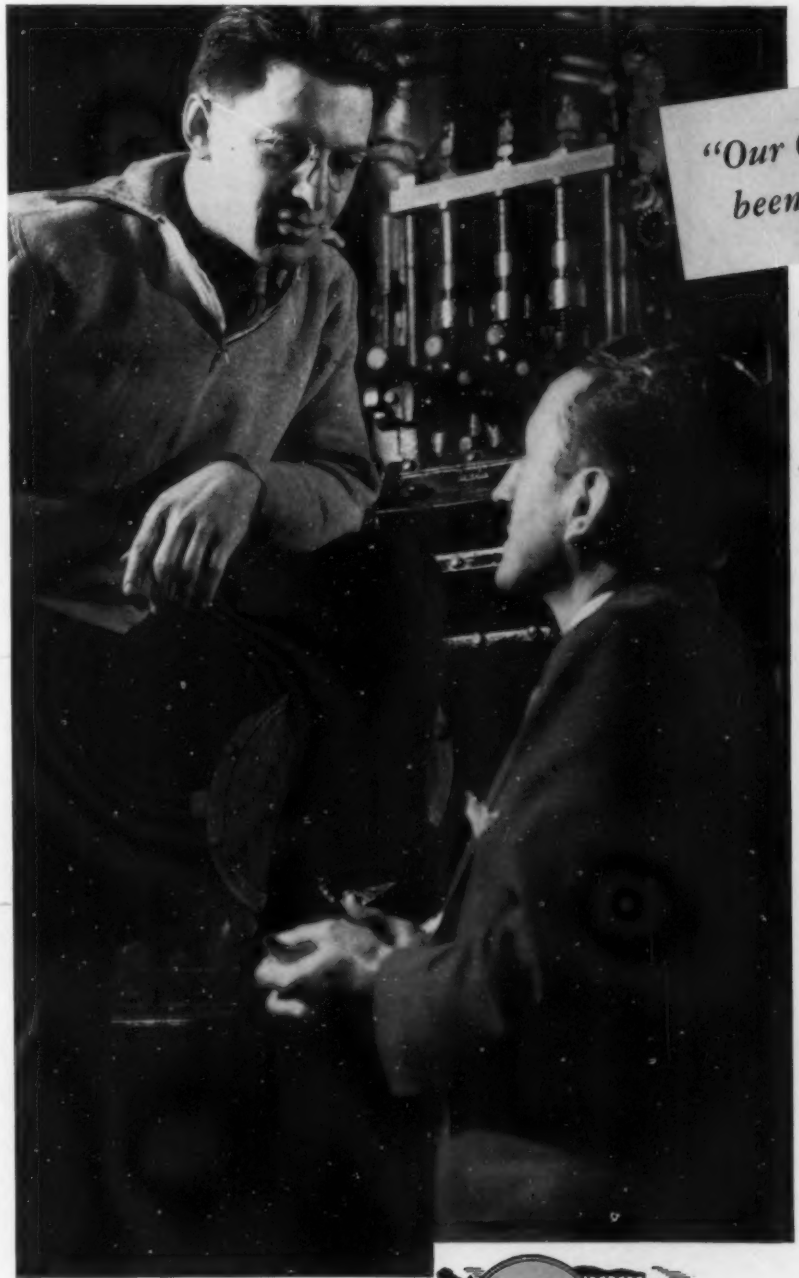
Capstans
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Car Couplings and Hitches
Macwhyte Co.

Car Dumpers
Eagle Iron Works
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Car Pullers & Movers
American Hoist & Derrick Co.
Chain Belt Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

"We adopted this GULF engineer's recommendations . . . and saved 2/3rds on maintenance" ...SAYS THIS SUPERINTENDENT



"Our Operating Record has been greatly improved"

"IF a Diesel operator ever had troubles, we had them," says this superintendent. "During our busy summer season we averaged a shutdown every 17 days to pull pistons, clean carbon, rings, and exhaust ports. Taking down hot engines in hot weather was no fun—and our maintenance costs were out of all reason.

"But last season was a different story. After we put the Gulf engineer's recommendations into practice, we were able to run through the whole summer without any of the troubles we had previously experienced! Gulf's high quality lubricating oil is helping us keep our equipment in top-notch condition the year around."

Gulf Diesel Lubricating Oils have been approved by more than fifty leading manufacturers of Diesel engines! A recent survey made by a prominent engineering society on Diesel engine performance efficiency shows the two outstanding records are held by engines lubricated with Gulf Diesel Lubricating Oils.

Ask a Gulf representative to recommend the proper lubricants for your equipment. You will not be obligated, and he will cooperate with you in every way possible to insure highest operating efficiency from your equipment. Gulf products are quickly available to you through more than 1100 warehouses in 28 states from Maine to Texas.

Actual photo of a Gulf lubrication engineer (right) consulting with the superintendent of the plant regarding Diesel lubrication and operation.

GULF INDUSTRIAL LUBRICATION

Gulf Oil Corporation
Gulf Refining Company
GENERAL OFFICES: GULF BUILDING, PITTSBURGH, PA.

Classified Directory (Cont.)

Cars (Industrial, Quarry, Dump, Concrete, Block, etc.)
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Columbia Steel Co. (U.S. Steel Corp. Sub.)
Eagle Iron Works
Link-Belt Co.
Multiplex Concrete Machy. Co.
Ransome Concrete Machy. Co.
Sanford-Day Iron Works
Traylor Engr. & Mfg. Co.

Car Wheels
Eagle Iron Works
Link-Belt Co.

Carts
Blaw-Knox Co.
Jaeger Machine Co.
Link-Belt Co.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.

Castings
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Blaw-Knox Co.
Chain Belt Co.
Chicago Steel Foundry Co.
Diamond Iron Works, Inc.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Frog, Switch & Mfg. Co.
Hardinge Co., Inc.
Hetherington & Bener, Inc.
Jeffrey Mfg. Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Timken Roller Bearing Co.
Traylor Engr. & Mfg. Co.
Wall-Colmonoy Corp.

Cement Colors
Mepham, Geo. S., Corp.

Cement Plants
Allis-Chalmers Mfg. Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Cement Process
Cement Process Corp.

Cement Pumps
Fuller Co.
Smidth, F. L., & Co.

Central Mixing Plants (Concrete)
Blaw-Knox Co.
Chain Belt Co.
Heltzel Steel & Iron Co.
Jaeger Machine Co.

Chain (Conveyor & Elevator)
Bacon, Earle C., Inc.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Straub Mfg. Co.

Chain (Dredge & Shovel)
Bucyrus-Erie Co
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Straub Mfg. Co.

Chimney Block Machine & Molds
Besser Co.
Multiplex Concrete Machy. Co.

Chutes (Bin, Concrete, etc.)
Allis-Chalmers Mfg. Co
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Blaw-Knox Co.
Chain Belt Co.
Cross Engineering Co.
Eagle Iron Works
Fuller Co.
Hardinge Co.
Hendrick Mfg. Co
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Northern Blower Co.
Pioneer Engineering Works
Ransome Concrete Machy. Co.
Robins Conveying Belt Co
Ross Screen & Feeder Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Chute Liners
Bacon, Earle C., Inc.
Cross Engineering Co
Frog, Switch & Mfg. Co.
Goodyear Tire & Rubber Co., Inc.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Circuit Breakers
Allis-Chalmers Mfg. Co.
General Electric Co.

Circuit Testers
Du Pont, E. I., De Nemours & Co
General Electric Co.

Clarifiers
Chain Belt Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.

Classifiers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Eagle Iron Works
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Lewistown Fdry. & Machy. Co.
Link-Belt Co.
Nordberg Mfg. Co.
Northern Blower Co.
Pioneer Engineering Works, Inc.
Raymond Pulverizer Div.
Simplicity Engineering Co.
Smidth, F. L., & Co.
Straub Mfg. Co., Inc.
Traylor Engr. & Mfg Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Clutches
Allis-Chalmers Mfg. Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.

Coal Pulverizing Equipment
Allis-Chalmers Mfg Co.
Austin-Western Road Machy. Co.
Combustion Engr. Corp.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Concentrators
Straub Mfg Co., Inc.

Concrete Mixers
Anchor Concrete Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Koehring Co.
Multiplex Concrete Machy. Co.
Ransome Concrete Machy. Co.
Straub Mfg. Co., Inc.

Controllers (Electric)
Allis-Chalmers Mfg. Co.
General Electric Co.

Converters (Electric)
Allis-Chalmers Mfg. Co.
General Electric Co.

Conveyor Idlers & Rolls
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Chain Belt Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Works, Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Smidth, F. L., & Co.

Conveyors (Apron)
Allis-Chalmers Mfg. Co.
Barber-Greene Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Wickwire-Spencer Steel Co.

Conveyors (Belt)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Chicago Steel Foundry Co.
Diamond Iron Works, Inc.
Fuller Co.
Gay, Rubert M., Div.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jeffrey Mfg. Co.
Lewistown Fdry. & Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Machy. Co.

Classified Directory (Cont.)

Pioneer Engineering Works, Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Rogers Iron Works Co.
Smidth, F. L., Co.
Smith Enginering Works
Straub Mfg. Co., Inc.
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Conveyors (Drag-Chain)
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors (Overhead)
Chain Belt Co.

Conveyors (Pan)
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors (Pneumatic)
Fuller Co.
Northern Blower Co.
Raymond Pulverizer Div.

Conveyors (Portable)
Austin-Western Road Machy. Co.
Barber-Greene Co.
Diamond Iron Works, Inc.
Fuller Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engineering Works, Inc.
Robins Conveying Belt Co.
Universal Crusher Co.

Conveyors (Screw)
Besser Mfg. Co.
Chain Belt Co.
Eagle Iron Works
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.

Conveyors (Trolley)
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Conveyors (Vibrating)
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

Coolers
Allis-Chalmers Mfg. Co.
American Blower Co.
Blaw-Knox Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Coolers (Clinker)
Fuller Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Correcting Basins
Smidth, F. L., & Co.

Couplings (Flexible & Shaft)
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Cranes (Diesel, Electric, Gasoline, Steam)
American Hoist & Derrick Co.
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Industrial Brownhoist Corp.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
Northwest Engineering Co.
Speeder Machy. Corp.
Universal Crusher Co.

Cranes (Overhead Traveling)
Industrial Brownhoist Corp.

Cranes (Tractor)
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
Speeder Machy. Corp.

Cranes (Truck)
Speeder Machy. Corp.

Crawler Attachments
Allis-Chalmers Mfg. Co.
Link-Belt Co.

Crawling Tractor Excavators
Austin-Western Road Machy. Co.
Koehring Co.
Link-Belt Co.

Crusher Parts
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bacon, Earle C., Inc.
Dixie Machinery Mfg. Co.
Eagle Iron Works
Frog, Switch & Mfg. Co.
Jeffrey Mfg. Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Works, Inc.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.

Crushers (Cone)
Nordberg Mfg. Co.

Crushers (Hammer)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Columbia Steel Co. (U.S. Steel Corp. Sub.)
Dixie Machinery Mfg. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Straub Mfg. Co., Inc.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Jaw & Gyratory)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Diamond Iron Works, Inc.
Dixie Machinery Mfg. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Lewistown Fdry. & Machine Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Pioneer Engineering Works, Inc.
Rogers Iron Works Co.
Smith Engineering Works
Straub Mfg. Co., Inc.
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Universal Road Machinery Co.

Crushers (Laboratory)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bacon, Earle C., Inc.
Dixie Machinery Mfg. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Traylor Engineering & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Primary Breakers)
Allis-Chalmers Mfg. Co.
McLanahan & Stone Corp.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers Reduction
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
McLanahan & Stone Corp.
Smith Engineering Works
Traylor Engr. & Mfg. Co.

Crushers (Ring)
American Pulverizer Co.
Dixie Machinery Mfg. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Roll)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle S., Inc.
Besser Mfg. Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Rogers Iron Works Co.
Smith Engineering Works
Straub Mfg. Co., Inc.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Classified Directory (Cont.)

Crushing Rolls
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engineering Works, Inc.
Rogers Iron Works Co.
Straub Mfg. Co., Inc.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushing & Screening Plants (Portable)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Blaw-Knox Co.
Diamond Iron Works, Inc.
Dixie Machy. Mfg. Co.
Eagle Iron Works
Heltzel Steel Form & Iron Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Rogers Iron Works Co.
Smith Engr. Works
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Curing Racks
Besser Mfg. Co.
Multiplex Concrete Machy. Co.

Decks, Vibrating Screen
Hendrick Mfg. Co.

Dedusters
Blaw-Knox Co.

Dehydrators
Pioneer Engineering Works, Inc.

Derricks
American Hoist & Derrick Co.
Hayward Co.

Detonators
Du Pont, E. I., de Nemours & Co.
Ensign-Bickford Co.

Dewatering Equipment
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Hardinge Co., The
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Diaphragms (Rubber)
Jaeger Machine Co.

Dippers & Teeth (Dredge & Shovel)
Bucyrus-Erie Co.
Frog, Switch & Mfg. Co.
Koehring Co.
Link-Belt Co.

Disintegrators
Smidth, F. L., & Co.

Ditchers
Barber-Greene Co.
Bucyrus-Erie Co.
Link-Belt Co.

Dragline & Cable Excavators
American Cable Co.
American Hoist & Derrick Co.
American Steel & Wire Co. (U.S. Steel Corp. Sub.)
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Diamond Iron Works, Inc.
Koehring Co.
Lima Locomotive Works, Inc. (Shovel & Crane Div.)
Link-Belt Co.
Pioneer Engr. Works, Inc.
Sauerman Bros., Inc.
Speeder Machy. Corp.
Wickwire-Spencer Steel Co.

Dredge Cutter Heads & Ladders
Bucyrus-Erie Co.
Eagle Iron Works
Hetherington & Berner, Inc.

Dredge Hulls
Eagle Iron Works

Dredges
American Hoist & Derrick Co.
Bucyrus-Erie Co.
Eagle Iron Works
Hayward Co.
Hetherington & Berner, Inc.
Link-Belt Co.
Straub Mfg. Co., Inc.

Dredge Sleeves
Hetherington & Berner, Inc.
Thermoid Rubber Co.

Drilling Accessories
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drill Bits
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drills (Blast Hole)
Bucyrus-Erie Co.

Drill Sharpening Machines
Bucyrus-Erie Co.

Drills (Rock)
Bucyrus-Erie Co.
Jeffrey Mfg. Co.
Timken Roller Bearing Co.

Drills (Well)
Bucyrus-Erie Co.

Drives (Belt Chain & Rope)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Diamond Iron Works, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Short-Center)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Link-Belt Co.
Smidth, F. L., & Co.

Drives (Worm)
Link-Belt Co.

Dryers
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Combustion Engr. Co.
Hardinge Co., Inc.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Williams Patent Crusher & Pulv. Co.

Dust Arrestors
Blaw-Knox Co.

Dust Collecting Systems
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Hendrick Mfg. Co.
Northern Blower Co.
Raymond Pulverizing Div.
Smidth, F. L., & Co.

Dust Collecting Bags
Blaw-Knox Co.

Dust Conveying Systems
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Fuller Co.
Raymond Pulverizer Div.

Dynamite
Du Pont, E. I., de Nemours & Co.

Electric Cables
General Electric Co.

Electric Motors
Allis-Chalmers Mfg. Co.
General Electric Co.
Hayward Co.

Electric Motor Starters
Allis-Chalmers Mfg. Co.
General Electric Co.

Elevators
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Chicago Steel Fdry. Co.
Cross Engr. Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Fuller Co.
Gay, Rubert M., Div.
Hendrick Mfg. Co.
Industrial Brownhoist Corp.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Lewistown Fdy. & Machine Co.
Link-Belt Co.
McLanahan & Stone Corp.
Multiplex Concrete Machy. Co.
Pioneer Engineering Works, Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Rogers Iron Works
Smidth, F. L., & Co.

Classified Directory (Cont.)

Smith Engineering Works
Straub Mfg. Co., Inc.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Engineers (Designing & Consulting)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Blaw-Knox Co.
Fuller Co.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Merrick Scale Co.
Northern Blower Co.
Robins Conveying Belt Co.
Rogers Iron Works
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Engines (Diesel, Gas, Kerosene & Oil)
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Co.
Nordberg Mfg. Co.

Engines (Natural Gas)
Allis-Chalmers Mfg. Co.

Engines (Steam)
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Co.
Nordberg Mfg. Co.

Exhausters
Combustion Engr. Co.
Raymond Pulverizer Div.

Explosives
Du Pont, E. I., de Nemours & Co.

Fans
Blaw-Knox Co.
General Electric Co.
Jeffrey Mfg. Co.
Northern Blower Co.
Smidth, F. L., & Co.

Feeders
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Barber-Greene Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Diamond Iron Works, Inc.
Fuller Co.
Gay, Rubert M., Div.
Hardinge Co., Inc.
Hetherington & Berner, Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Merrick Scale Mfg. Co.
Northern Blower Co.
Pennsylvania Crusher Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Schaffer Poidometer Co.
Smidth, F. L., & Co.
Smith Engineering Works
Straub Mfg. Co., Inc.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.

Filter Cloth
Northern, Blower Co.
Roeblings, John A., Sons Co.
Tyler, W. S., Co.
Wickwire-Spencer Steel Co.

Forgings
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Laughlin, Thomas, Inc.

Frogs & Switches
Frog, Switch & Mfg. Co.

Fuels (Diesel)
Texas Co.

Furnaces (Heat Treating, Electric)
General Electric Co.

Fuse Cutouts
General Electric Co.

Fuse Cutters
Ensign-Bickford Co.

Fuse Lighters
Ensign-Bickford Co.

Fuses (Detonating & Safety)
Ensign-Bickford Co.

Fuses (Electric)
General Electric Co.

Galvanometers
General Electric Co.

Gaskets
Goodyear Tire & Rubber Co.

Gasoline
Gulf Refining Co.
Texas Co.

Gas Producers
Blaw-Knox Co.

Gear-Motors
Allis-Chalmers Mfg. Co.
General Electric Co.
Link-Belt Co.

Gears
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Diamond Iron Works, Inc.
Frog, Switch & Mfg. Co.
General Electric Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Generator & Motor Generator Sets
Allis-Chalmers Mfg. Co.
General Electric Co.
Nordberg Mfg. Co.

Glass Sand Equipment
Lewistown Fdry. & Mach. Co.

Grapples
Blaw-Knox Co.
Bucyrus-Erie Co.
Hayward Co.
Owen Bucket Co.

Grating
Blaw-Knox Co.
Eagle Iron Works
Hendrick Mfg. Co.

Grease
Bacon, Earle C., Inc.
Gulf Refining Co.
Texas Co.

Grease Cups
Link-Belt Co.
Robins Conveying Belt Co.

Guards (Lamp)
Flexible Steel Lacing Co.

Guards (Machinery)
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Tyler, W. S., Co.

Guns
Hetherington & Berner, Inc.

Gypsum Plants
Traylor Engr. & Mfg. Co.

Hangers, Anchors & Inserts (Concrete)
Allis-Chalmers Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Haulage Systems (Electric)
General Electric Co.
Jeffrey Mfg. Co.

Haulage Systems (Remote Control)
Dempster Bros.
General Electric Co.
Koehring Co.

Hoists (Chain, Electric, Skip, Portable, Air, etc.)
Allis-Chalmers Mfg. Co.
American Hoist & Derrick Mfg. Co.
Besser Mfg. Co.
Chain Belt Co.
Commercial Shearing & Stamping Co.
Diamond Iron Works, Inc.
Eagle Iron Works
Gay, Rubert M., Div.
Hetherington & Berner, Inc.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engr. Works, Inc.
Robins Conveying Belt Co.
Sauerman Bros., Inc.
Smith Engineering Works
Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.

Hoppers
Austin-Western Road Machy. Co.
Besser Mfg. Co.
Blaw-Knox Co.
Chain Belt Co.
Gay, Rubert M., Div.
Hardinge Co., Inc.
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Merrick Scale Co.
Pioneer Engr. Wks., Inc.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Rogers Iron Works Co.
Traylor Engr. & Mfg. Co.
Universal Road Machy. Co.

Hose (Air, Drill, Water, Steam, Sand Suction & Discharge)
Dixie Machinery Co.
Goodyear Tire & Rubber Co.
Hetherington & Berner, Inc.
Jaeger Machine Co.

Hydrators
Blaw-Knox Co.
Hardinge Co., Inc.
Traylor Engr. & Mfg. Co.

Jigs (Sand & Gravel)
Allis-Chalmers Mfg. Co.
Hardinge Co.
Traylor Engr. & Mfg. Co.

Classified Directory (Cont.)

Joists & Slab Machines (Concrete)
Besser Mfg. Co.
Kiln Burners
Smidth, F. L., & Co.
Kiln Chain Systems
Smidth, F. L., & Co.
Kiln Liners
Hardinge Co., Inc.
Traylor Engr. & Mfg. Co.
Kiln Parts
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Chicago Steel Foundry Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Kilns (Rotary)
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engineering & Mfg. Co.
Kilns (Shaft)
Hardinge Co., Inc.
Kilns (Vertical)
Blaw-Knox Co.
Hardinge Co., Inc.
Kominuters
Smidth, F. L., & Co.
Laboratory Apparatus
Ransome Concrete Machy. Co.
Smidth, F. L., & Co.
Lift Trucks
Besser Mfg. Co.
Lime Handling Equipment
Combustion Engr. Corp.
Fuller Co.
Hardinge Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Raymond Pulv. Div.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.
Lime Plants
Allis-Chalmers Mfg. Co.
American Pulv. Co.
Blaw Knox
Hardinge Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Loaders (Boat)
Chain Belt Co.
Fuller Co.
Link-Belt Co.
Loaders (Box Car)
Barber-Greene Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Loaders (Car, Truck, Bin & Hopper)
Barber-Greene Co.
Besser Mfg. Co.
Bucyrus-Erie Co.
Chain Belt Co.
Diamond Iron Works
Fuller Co.
Gay, Rubert M. Div.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Ross Screen & Feeder Co.
Universal Crusher Co.
Universal Road Machy. Co.
Loaders (Underground)
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
Diamond Iron Works
Jeffrey Mfg. Co.
Nordberg Mfg. Co.
Locomotive Stack Netting
Tyler W. S., Co.
Locomotives (Diesel-Electric)
Lima Locomotive Works (Loco. Div.)
Locomotives (Electric, Trolley & Storage Battery)
General Electric Co.
Jeffrey Mfg. Co.
Lima Locomotive Works, Inc. (Loco. Div.)
Locomotives (Gas & Gas-Electric)
General Electric Co.
Jeffrey Mfg. Co.
Lima Locomotive Wks., Inc. (Loco. Div.)
Locomotives (Kerosene)
Lima Locomotive Works, Inc. (Loco. Div.)
Locomotives (Oil & Oil-Electric)
General Electric Co.
Locomotives (Steam)
Lima Locomotive Works, Inc. (Loco. Div.)
Lubricants
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Texas Co.
Machine Shop Equipment
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Magnetic Separators
Allis-Chalmers Mfg. Co.
Diamond Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Magnets
General Electric Co.
Manganese Steel Parts
Bacon, Earl S., Inc.
Dixie Machy. Mfg. Co.
Frog, Switch & Mfg. Co.
Material Handling Equipment
Austin-Western Rd. Machy. Co.
Barber-Greene Co.
Chain Belt Co.
Diamond Iron Works, Inc.
Fuller Co.
Hardinge Co., Inc.
Heltzel Steel Form & Iron Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.
Raymond Pulv. Div.
Robins Conveying Belt Co.
Measuring Devices
Blaw-Knox Co.
Fuller Co.
General Electric Co.
Hardinge Co., Inc.
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Schaffer Poidometer Co.
Mechanical Rubber Goods
Goodyear Tire & Rubber Co.
Thermoid Rubber Co.
Mill Liners
Allis-Chalmers Mfg. Co.
Columbia Steel Co. (U.S. Steel Corp. Subsi.)
Dixie Machy. Mfg. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Mill Parts
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.
Mills, Grinding (Ball, Compartment, Emery, Hammer, Pug, Rod, Roll, Tube, etc.) (See Pulverizers also)
Allis-Chalmers Mfg. Co.
American Puverizing Co.
Dixie Machinery Mfg. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Lewistown Fdy. & Machy. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Straub Mfg. Co., Inc.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Williams Patent Crusher & Pulv. Co.
Mortar Mixers
Chain Belt Co.
Eagle Iron Works
Jaeger Machine Co.
Ransome Concrete Machy. Co.
Nails
American Steel Wire Co. (U.S. Steel Corp. Subsidiary)
Columbia Steel Co. (U.S. Steel Corp. Subsidiary)
Nozzles (Washing)
Chain Belt Co.
Link-Belt Co.
Oil Burners
Smidth, F. L., & Co.
Oils (Cutting)
Texas Co., The
Oils (Lubricating)
Bacon, Earle C., Inc.
Gulf Refining Co.
Robins Conveying Belt Co.
Texas Co., The
Outdoor Lighting Equipment
General Electric Co.
Packing
Goodyear Tire & Rubber Co., Inc.
Thermoid Rubber Co.
Pallets (Steel & Wood)
Anchor Concrete Machinery Co.
Bacon, Earl C., Inc.
Besser Mfg. Co.
Commercial Shearing & Stamping Co.
Multiplex Concrete Machy. Co.
Pans, Grinding (Wet & Dry)
Eagle Iron Wks.
McLanahan & Stone Corp.
Traylor Engr. & Mfg. Co.
Perforated Metal
Allis-Chalmers Mfg. Co.
Bacon, Earl C., Inc.
Chicago Perforating Co.

Classified Directory (Cont.)

Cross Engr. Co.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks., Inc.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Son, Inc.
Traylor Engr. & Mfg. Co.
Wickwire-Spencer Steel Co.

Pinions
Bacon, Earle C., Inc.
Chain Belt Co.
Frog, Switch & Mfg. Co., The
General Electric Co.
Jeffrey Mfg. Co., The
Link-Belt Co.

Pipe
Frog, Switch & Mfg. Co., The
Hetherington & Berner, Inc.

Pipe Fittings
Hetherington & Berner, Inc.

Pipe, Forms & Machine (Concrete)
Besser Mfg. Co.
Universal Concrete Pipe Co.

Plaster Mixers
Eagle Iron Works
Jaeger Machine Co.
Ransome Concrete Machy. Co.

Plaster Plants
Koehring Co.

Poidometers
Schaffer Poidometer Co.

Pontoons
Diamond Iron Wks.
Eagle Iron Wks.

Powder (Blasting)
Du Pont, E. I., de Nemours, & Co., Inc.

Powder Magazines
Du Pont, E. I., de Nemours, & Co.

Powder Transmission Machiner
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Diamond Iron Wks., Inc.
Jeffrey Mfg. Co., The
Link-Belt Company
Robins Conveying Belt Co.
Smidth, F. L., & Co.
Timken Roller Bearing Co., The

Power Units
Allis-Chalmers Mfg. Co.
Nordberg Mfg. Co.

Pulleys
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Diamond Iron Wks.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.

Pulverizer Parts
Allis-Chalmers Mfg. Co.
American Pulv. Co.
Dixie Machinery Mfg. Co.
Frog, Switch & Mfg. Co.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Smidth, F. L., & Co.

Pulverizers (Hammer, Ring, Rod & Roll) (See also Mills & Crushers)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Austin-Western Road Machy. Co.
Blaw-Knox Co.
Columbia Steel Co. (U.S. Steel Corp. Subsidiary)
Combustion Engr. Corp.
Dixie Machy. Corp.
Gay, Rupert M. Div.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Raymond Pulverizer Div.
Smidth, F. L., & Co.
Straub Mfg. Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Pumps (Diaphragm)
Chain Belt Co.
Hardinge Co., Inc.
Jaeger Machine Co.

Pump Valves (Dry Pulverized Material)
Fuller Co.

Pumps (Dredge)
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
Hetherington & Berner

Pumps (Dry Pulverized Material)
Fuller Co., The
Smidth, F. L., & Co.

Pumps (Slurry)
Allis-Chalmers Mfg. Co.
Hardinge Co., Inc.
Smidth, F. L., & Co.
Wilfley, A. R., & Sons, Inc.

Pump, Slurry, Valves
Fuller Co., The
Wilfley & Son

Pumps (Vacuum)
Allis-Chalmers Mfg. Co.
Fuller Co., The
Smidth, F. L., & Co.

Pumps (Water)
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Jaeger Machine Co.

Railway Equipment
General Electric Co.

Railways (Electric)
General Electric Co.

Rectifiers
Allis-Chalmers Mfg. Co.
General Electric Co.

Recuperators
Traylor Engr. & Mfg. Co.

Refractories
Smidth, F. L., Co.

Regulators (Voltage)
Allis-Chalmers Mfg. Co.
General Electric Co.

Rewashers (Screw)
Eagle Iron Works
Link-Belt Co.
Smith Engr. Wks.

Rheostats
General Electric Co.

Roofing
Ryerson, Jos. T., & Son, Inc.
Texas Co., The

Rope (Transmission)
Allis-Chalmers Mfg. Co.

Sand Drags
Eagle Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Smith Engr. Wks.

Sand and Gravel Plants
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co., The
Bacon, Earle C., Inc.
Diamond Iron Wks.
Eagle Iron Wks.
Hardinge Co., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Traylor Engr. & Mfg. Co.

Sand Lime Brick Machinery
Diamond Iron Wks.
Hardinge Co.
Jeffrey Mfg. Co.

Sand Separators
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engineering Wks., Inc.
Simplicity Engineering Co.
Smith Engineering Wks.

Sand Settling Tanks
Eagle Iron Wks.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Nordberg Mfg. Co.
Pioneer Engr. Wks.
Smith Engr. Wks.

Scales
Chain Belt Co.
Merrick Scale Mfg. Co.

Scales (Hopper)
Blaw-Knox Co.
Merrick Scale Co.

Scales (Truck & Track)
Hardinge Co.

Scrapers (Power Drag)
American Hoist & Derrick Co.
Austin-Western Rd. Machy. Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Diamond Iron Wks.
Hayward Co., The
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks.
Sauerman Bros.

Scrapers (Wagon)
Bucyrus-Erie Co.

Screen Cloth & Plates (Perforated)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chicago Perforating Co.
Cross Engineering Co.

Classified Directory (Cont.)

Harrington & King Perforating Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Ryerson, Jos. T., & Sons, Inc.
Standard Stamping & Perforating Co.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Crusher Co.
Wickwire-Spencer Steel Co.

Screen Parts
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Diamond Iron Wks.
Hardinge Co., Inc.
Hendrick Mfg. Co.
Pioneer Engr. Wks.
Traylor Engr. & Mfg. Co.
Wickwire-Spencer Steel Co.

Screens
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Diamond Iron Wks.
Eagle Iron Works
Hardinge Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Co.
Nordberg Mfg. Co.
Pioneer Engr. Wks.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Rogers Iron Wks. Co.
Simplicity Engr. Co.
Smith Engr. Wks.
Straub Mfg. Co.
Traylor Engr. & Mfg. Co.
Tyler, W. S., & Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Screens (Grizzly)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Diamond Iron Wks.
Eagle Iron Wks.
Gay, Rubert M. Div.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Pioneer Engr. Wks. Inc.
Productive Equipment Corp.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Ross Screen & Feeder Co.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Rd. Machinery Co.
Universal Vibrating Screen Co.

Screens (Laboratory)
Allis-Chalmers Mfg. Co.
Hardinge Co., Inc.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Roebling's, John A., Sons, Co.
Smidth, F. L., & Co.
Tyler, W. S., Co.
Wickwire Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Screens (Revolving)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Diamond Iron Wks.
Eagle Iron Wks.
Gay, Rubert W. Div.
Hardinge Co., Inc.
Hendrick Mfg.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Robins Conveying Belt
Roebling's Engr. Wks.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Crusher Co.
Universal Rd. Machinery Co.

Screens (Rotary)
Link-Belt Co.
Smith Engr. Wks.

Screens (Scalping)
Allis-Chalmers Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Smith Engr. Wks.
Williams Patent Crusher & Pulv. Co.

Screens (Trommel)
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Screens (Vibrating)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machinery Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Diamond Iron Wks.
Eagle Iron Wks.
Hardinge Co., Inc.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Lewistown Fdry. & Mach. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Nordberg Mfg. Co.
Pioneer Engr. Wks., Inc.
Robins Conveying Belt Co.
Roebling's John A., Sons Co.
Rogers Iron Wks., Co.
Screen Iron Wks. Co.
Screen Equipment Co.
Simplicity Engr. Co.
Smith Engr. Wks.
Straub Mfg. Co.
Tyler, W. S., Co.
Universal Crusher Co.
Universal Vibrating Screen Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Screens (Washing)
Chain Belt Co.
Link-Belt Co.
McLanahan & Stone Corp.

Scrubbers (Washers)
Link-Belt Co.
McLanahan & Stone Corp.
Rogers Iron Wks. Co.
Smith Engr. Wks.
Tyler, W. C., Co.

Seal Rings
Traylor Engr. & Mfg. Co.

Shafting
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Shale Planers
Eagle Iron Works

Sheaves
Allis-Chalmers Mfg. Co.
American Steel & Wire Co.
Columbia Steel Co.
Diamond Iron Wks.
Eagle Iron Wks.
Hetherington & Berner
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks.
Ransome Concrete Machinery Co.
Roebling's, John A., Sons Co.
Sauerman Bros.

Shovels (Compressed Air)
Nordberg Mfg. Co.

Shovels, Power (Diesel, Diesel-Air Electric, Gasoline, Gas-Electric, Oil, Steam)
American Hoist & Derrick Co.
Austin-Western Rd. Machinery Co.
Bucyrus-Erie Co.
Koehring Co.
Industrial Brownhoist Corp.
Lima Locomotive Wks., Inc.
Link-Belt Co.
Speeder Machy. Corp.

Shovels (Tractor)
Austin-Western Rd. Machy. Co.
Koehring Co.
Lima Locomotive Wks., Inc.
Link-Belt Co.
Speeder Machy. Corp.

Shovels (Truck)
Speeder Machinery Corp.

Shovels (Underground)
Allis-Chalmers Mfg. Co.
Lima Loco. Wks., Inc. (Shovel & Crane Div.)
Nordberg Mfg. Co.

Shredders
Williams Patent Crusher & Pulv. Co.

Sieves (Testing)
Hendrick Mfg. Co.
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Tyler, W. S.

Silos (Storage)
Blaw-Knox Co.
Smidth, F. L., & Co.

Classified Directory (Cont.)

Silo Stave Machines (Concrete)
Besser Mfg. Co.

Skids
Besser Mfg. Co.

Slakers (Rotary)
Traylor Engr. & Mfg. Co.

Slugs (Grinding)
Smidth, F. L., & Co.

Slurry Mixers
Hardinge Co., Inc.
Smidth, F. L., & Co.

Slurry Separators
Smidth, F. L., & Co.

Slurry Thickeners
Hardinge Co., Inc.
Smidth, F. L., & Co.
Traylor Engr. & Mfg. Co.

Smokestacks
Hendrick Mfg. Co.
Northern Blower Corp.
Traylor Engr. & Mfg. Co.

Speed Reducers (Gear, etc.)
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.
Smidth, F. L., Co.
Traylor Engr. & Mfg. Co.

Spouts
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Ransome Concrete Machy. Co.
Traylor Engr. & Mfg. Co.

Sprays & Spraying Equipment
Link-Belt Co.

Sprockets
Allis-Chalmers Mfg. Co.
Bacon, Earle C., Inc.
Chain Belt Co.
Diamond Iron Works
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Straub Mfg. Co.

Stabilization Equipment
Barber-Greene Co.
Besser Mfg. Co.
Pioneer Engr. Wks.

Standpipes
Ross Screen & Feeder Co.

Steel (Abrasive-Resisting)
Ryerson, Jos. T., & Son, Inc.

Steel (Electric Furnace)
Timken Roller Bearing Co., The

Steel (Open Hearth)
Timken Roller Bearing Co., The

Steel (Special Alloy)
Chicago Steel Foundry Co.
Timken Roller Bearing Co., The

Stokers
Combustion Engr. Co., Inc.
Link-Belt Co.

Storage Equipment
Barber-Greene Co.
Blaw-Knox Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

Strippers (Concrete)
Anchor Concrete Machinery Co.
Multiplex Concrete Machinery Co.

Switchboards
Allis-Chalmers Mfg. Co.
General Electric Co.

Tachometers
General Electric Co.

Tampers (Power & Hand)
Anchor Concrete Machinery Co.
Besser Mfg. Co.
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Tanks (Air, Storage, etc.)
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Combustion Engr. Co.
Eagle Iron Wks.
Hardinge Co., Inc.
Heltzel Steel Form & Iron Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Northern Blower Co.
Pioneer Engr. Wks.
Raymond Pulv. Div.
Traylor Engr. & Mfg. Co.

Testing Instruments
General Electric Co.

Tires and Tubes
Goodyear Tire & Rubber Co., Inc.

Towers
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Eagle Iron Works
Hendrick Mfg. Co.
Jaeger Machine Co.
Ransome Concrete Machy. Co.
Robins Conveying Belt Co.
Sauerman Bros., Inc.

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Columbia Steel Co. (U.S. Steel Corp. Subsidiary)
Nordberg Mfg. Co.

Track Shifters
Nordberg Mfg. Co.

Track Systems (Overhead)
Jeffrey Mfg. Co.
Link-Belt Co.

Tractors
Allis-Chalmers Mfg. Co.
Koehring Co.

Tractors (Electric)
Link-Belt Co.

Trailers (Industrial, Quarry)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machinery Co.
Koehring Co.
Speeder Mach. Corp.

Transformers
Allis-Chalmers Mfg. Co.
General Electric Co.

Trench Hoes
Speeder Machy. Corp.

Trucks (Agitator)
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Chain Belt Co.
Jaeger Machine Co.
Smidth, F. L., & Co .

Truck Bodies (Dump)
Commercial Shearing & Stamping Co.
Dempster Bros.
Hendrick Mfg. Co.

Trucks (Mixer)
Blaw-Knox Co.
Chain Belt Co.
Jaeger Machine Co.
Ransome Concrete Machinery Co.
Smidth, F. L., & Co.

Tubing (Seamless Steel)
Timken Roller Bearing Co.

Turbines
Allis-Chalmers Mfg. Co.
General Elec. Co.

Turnbuckles
Macwhyte Co.

Unloaders (Car, Bin, Truck, etc.)
Barber-Greene Co.
Bucyrus-Erie Co.
Chain Belt Co.
Diamond Iron Wks.
Fuller Co.
Gay, Rubert M. Div.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Universal Crusher Co.
Universal Road Machinery Co.

Unloaders (Boat)
Chain Belt Co.
Link-Belt Co.

Unloaders (Box Car)
Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Diamond Iron Wks.
Fuller Co.
Gay, Rubert M. Div.
Jeffrey Mfg. Co.
Link-Belt Co.
Universal Rd. Machinery Co.

Unloaders (Pneumatic)
Fuller Co.

Unloaders (Underground)
Diamond Iron Wks.
Jeffrey Mfg. Co.
Nordberg Mfg. Co.

Ventilating Apparatus
Blaw-Knox Co.
Northern Blower Co.

Vibrators (Bin and Concrete Form)
Besser Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Tyler, W. S.

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Allis-Chalmers
Austin-Western Rd. Machinery Co., The
Bacon, Earle C., Inc.
Chain Belt Co.
Diamond Iron Wks.
Eagle Iron Works
Gay, Rubert W. Div.
Hardinge Co., Inc.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.

Classified Directory (Cont.)

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Nordberg Mfg. Co.
Pioneer Enginering Wks.
Robins Conveying Belt Co.
Simplicity Engr. Co.
Smith Engr. Wks.
Tyler, W. S., Co.
Universal Crusher Co.
Universal Vibrating Screen Co.
Wickwire-Spencer Steel Co.
Williams Patent Crusher & Pulv. Co.

Wagons (Dump)
Allis-Chalmers Mfg. Co.
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Blaw-Knox Co.
Koehring Co.

Washers (Log)
Allis-Chalmers Mfg. Co.
Chain Belt Co.
Diamond Iron Works
Eagle Iron Works
Hardinge Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pioneer Engr. Wks., Inc.
Smith Engr. Wks.
Traylor Engr. & Mfg. Co.

Washers (Sand, Gravel & Stone)
Allis-Chalmers Mfg. Co.
Austin-Western Rd. Machy. Co.
Bacon, Earle C., Inc.
Diamond Iron Works
Gay, Rubert M. Div.
Hardinge Co., Inc.
Hendrick Mfg.
Jeffrey Mfg. Co.
Lewiston Fdry. & Machy. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Smidth, F. L., & Co.
Smith Engr. Wks.
Straub Mfg. Co.
Traylor Engr. & Mfg. Co.
Tyler, W. S., Co.
Universal Crusher Co.
Universal Road Machy. Co.
Universal Vibrating Screen Co.
Wickwire-Spencer Steel Co.

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Chain Belt Co.
Fuller Co.
Hardinge Co.
Heltzel Steel Form & Iron Co.
Jaeger Machine Co.
Merrick Scale Co.
Schaffer Poidometer Co.

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American Steel & Wire Co.
Columbia Steel Co. (U.S. Steel Corp. Subsidiary)
General Electric Co.
Ransome Concrete Machinery Co.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Welding Electrodes
American Steel & Wire Co. (U.S. Steel Corp. Sub.)
Columbia Steel Co. (U.S. Steel Corp. Subsidiary)

Welding Rods
American Steel & Wire Co. (U.S. Steel Corp. Sub.)
Columbia Steel Corp. (U.S. Steel Corp. Sub.)
Roebling's, John A., Sons Co.
Ryerson, Jos. T., & Son, Inc.

Welding Wire
American Steel & Wire Co. (U.S. Steel Corp. Sub.)
Columbia Steel Co. (U.S. Steel Corp. Subsidiary)
Hazard Wire Rope Div.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Winches
American Hoist & Derrick Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.

Wire Cloth
American Steel & Wire Co. (U.S. Steel Corp. Sub.)
Bacon, Earle C., Inc.
Cleveland Wire Cloth & Mfg. Co.
Columbia Steel Co. (U.S. Steel Corp. Subsidiary)
Eagle Iron Works
Leschen, A., & Sons Rope Co.
Link-Belt Co.
Ludlow-Saylor Wire Co.
Pioneer Eng. Wks., Inc.
Robins Conveying Belt Co.
Roebling's, John A., Sons Co.
Tyler, W. S., Co.
Universal Vibrating Screen Co.
Wickwire-Spencer Steel Co.

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American Steel & Wire Co. (U.S. Steel Corp. Sub.)
Columbia Steel Co. (U.S. Steel Corp. Subsidiary)
General Electric Co.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

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Columbia Steel Co. (U.S. Steel Corp. Subsidiary)
General Electric Co
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope
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American Steel & Wire Co. (U.S. Steel Corp. Sub.)
Columbia Steel Co. (U.S. Steel Corp. Subsidiary)
Hazard Wire Rope Co.
Leschen A., & Sons, Rope Co.
Macwhyte Co.
Roebling's, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope Clips
American Cable Co.
American Hoist & Derrick Co.
American Steel & Wire Co. (U.S. Steel Corp. Sub.)
Columbia Steel Co. (U.S. Steel Corp. Subsidiary)
Hazard Wire Rope Co.
Leschen A., & Sons
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Roebling's, John A., Sons Co.
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Columbia Steel Co. (U.S. Steel Corp. Subsidiary)

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American Hoist & Derrick Co.
American Steel & Wire Co. (U.S. Steel Corp. Sub.)
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Leschen A. & Sons, Rope Co.
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Roebling's, John A., Sons Co.
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Roebling's, John A., Sons Co.
Texas Co., The

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Columbia Steel Co. (U.S. Steel Corp. Subsi.)
Hazard Wire Rope Co.
Leschen, A., & Sons, Rope Co.
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Laughlin, Thomas, Inc.
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Macwhyte Co.
Roeblings, John A., Sons Co.
Wickwire-Spencer Steel Co.

Wire Rope Thimbles
Laughlin, Thomas, Inc.
Macwhyte Co.

Wire Turnbuckles
Laughlin, Thomas, Inc.

Classified Advertisements

CLASSIFIED RATES

POSITIONS WANTED — POSITIONS VACANT Set in six-point type. Minimum $1.00 each insertion, payable in advance.

INFORMATION—Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, 30 inches to the page.

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Consolidated Offers:

VIBRATING SCREENS

5—5'x10' Symons Screens, 2-deck, each with 7½ H.P. 3/60/440 volt motor.
5—4'x7' Jeffrey-Traylor FB-4, magnetic, all 2-deck. Used 30 days. With motor generator sets, panels, etc.
2—4'x8' Robins Gyrex, 2-deck.
2—3'x6' Sturtevant Moto-Vibro, 2-deck.
8—Tyler Hummers, 3'x5', 4x5, 4x7, 1 to 3 decks.

LOCOMOTIVE

16-ton Whitcomb Gasoline Locomotive, standard gauge, 6-cylinder, 6x7 motor, self-starter. 90% new. Running demonstration.

LOCOMOTIVE CRANE

25-ton capacity Ohio, 8 wheel, standard gauge, ASME boiler, double drum, 50 ft. boom.

JAW CRUSHERS

42"x48" Traylor; 15x30, 18x36, 24x36, 30x42" Farrel; 24"x36", 36x48 Allis-Chalmers; 30x42 Buchanan.

REDUCTION GYRATORY CRUSHERS

2' Telsmith Gyrasphere; 2' Symons Cone; 4' Traylor No. 410-TZ; 5" Newhouse with 40 H.P. motor; Nos. 19, 25, 37, 49 Kennedy.

BINS

18—10'x30' Vertical Tanks, 125 tons. At Peekskill, N. Y.
1—Blaw Knox 300 bbl. Cement Bin, electric scales, generator sets. Complete.

AIR COMPRESSORS

2—No. 315 and No. 370 I.R. Portable—Oil Engine driven.
2—POC, I.R., 506 CFM., Diesel driven.
2—POC-2 I.R., 550 CFM., Diesel driven.
1—PRE-2 I.R., 1300 CFM., syn. motor.
2—WN-31 Sullivan, 1573 CFM., syn. motors.

PULVERIZERS

2—4 roll Raymond High Side Mills, also 3-roll.
3—5 and 6-roll Raymond Low Side Mills.
8—Raymond beater types, Nos. 0000, 00, 1, 3, and Nos. 32, 55, 60 and 90 Imp. Mills.
1—24" No. 4 Mikro Pulverizer.
4—Sturtevant Ring Roll Mills, Nos. 0, 1, 2.
Coal Pulverizers—Raymond, Aero, Erie City, Simplex, Kennedy.
Kent Maxecon and Bradley Mills.

BALL, ROD AND TUBE MILLS

2—6'x12' Hardinge Rod Mills—direct drive.
2—6'x12' Allis-Chalmers Rod Mills, inc. motors.
1—3'x12' Hendy Tube Mill.
1—5'x36' Vulcan, 3-comp. iron lined, used 3 days.
6—Hardinge Conical Mills—4'6"x16", 5'x22", 6'x22", 8'x30".
1—6'x8' Patterson cont. Mill with air separator.
8—Pebble Mills: 4'6"x3'6", 5x4, 6x5, 7'6x5' and other sizes.
4—5'x22', 6x22, Tube Mills—iron and silex lined.
1—5'x10' Marcy Rod Mill.

AIR CLASSIFIERS

4—10' Sturtevant "Whirlwind".
4—8', 10', 12', 14' Gayco.
1—30" Raymond.

ROTARY DRYERS

9—3'x20, 4x30, 5x30, 6x40, 6x60, 8x60, 8'8"x85'.
2—5x30', 70"x35' Ruggles-Coles, double shell.
1—5x35' Indirect Heat, double shell.

ROTARY KILNS

3—6'x40' Bonnot, each complete with firing hood, spring seals and with or without rotary coolers; also 4'x30' Ruggles-Coles; 5x50' Vulcan; 5'4x33' Fuller; 6x60' Reeves; 7x100' Vulcan; 8x110' Reeves.

Write for detailed illustrated circulars.

CONSOLIDATED PRODUCTS CO., INC.
15-16-17 PARK ROW, NEW YORK, N. Y.
Our shops at Newark, N. J., cover eight acres.

CONCRETE—CEMENT—EQUIPMENT
Johnson concrete batching plant, complete, 100 yds. cap. with 300 bbl. cement bin, elevator, screw conveyor, etc. New 1937.
250 bbls. Blaw Knox cement bin, elevator, screw conveyor, weigh batchers, etc., complete plant.
155 bbls. Fuller cement bin, electric weigh batchers.
1 250 yd. 2 compartment Butler steel bin.
300 bbls. Heltzel cement bin, screw conveyor, elevator.
2 Smith 1 yd. tilting concrete mixers, water tank, hopper, and telltale, electric motor driven.
1 Fuller Kinyon Type B portable cement loader.
1 Fuller Kinyon rotary air compressor.
CRUSHERS—JAW—CONE—GYRATORY
Jaw—6x12, 9x16, 10x20, 12x36, 13x30, 18x36, 24x36.
Gyratory—Gates K. Nos. 4, 5, 6, 7½D, Kennedy Van Saun, Nos. 30, 37, 37B, 49, McCully Nos. 5, 6, McCully Superior 8".
CRANES—SHOVELS—DRAGLINES
1 Clyde Whirley, 30 tons cap., 105' boom, oil fired steam.
1 Bucyrus Erie steam shovel, 2 yds. capacity.
1 Marion No. 450 gas-electric shovel, 1¼ yd. cap. Guaranteed.
1 Browning, electric loco. crane, 15 tons, 45' boom.
1 42B Bucyrus Erie Diesel shovel 2 yds.
1 Lima, gas, caterpillar, 1¼ yds., crane-dragline.
CLAM SHELL—ORANGE PEEL BUCKETS
1—Williams Hercules 1½ yd. digging clamshell. NEW.
1—Owen ½ yd. clamshell digging bucket, type M.
1—Hayward ¾ yd. orange peel.
CONVEYOR EQUIPMENT
Barber Greene conveyors, 24", steel frames electric drive, 35' to 45' type N.
Belt conveyors, complete, steel frames, belt and motors, 24", lengths, 45' to 209'.
Conveyor belt, 18", 20", 24", 36".
Head & tail pulleys, take-ups, rollers, idlers.
MISCELLANEOUS
4—Mack Model AB dump trucks pneumatic.
Dredge pumps, 6", 8", 10", 12", 16".
Gas locomotives, 2½ to 35 tons.
V type, side dump steel cars, 2 & 3 yds., 36" ga.
Steel stone skips, 1½, 2, 4 yds.
1 American steel stiff leg derrick, 100' boom, 15 tons cap.
Clyde steel stiff leg, 80' boom, 10 tons.
Clyde 3 drum hoist and swinger, electric, 75 h.p.
1—3'x6' Vibrating Screen, 3 deck, K. V. S.
1—3'x6' Vibrating Screen, single deck, K. V. S.
1—Lawrence centrifugal pump, 8" x 8" gas, portable.
1—Double drum steam hoist, 2¼ x 10, code boiler.
2—Double drum steam hoists, 7 x 10, code boilers.

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30 CHURCH STREET, NEW YORK, N. Y.

FOR SALE

6-Yard Monighan diesel walking dragline. Two duplicates.
2¼-Yard Link-Belt diesel dragline. Two duplicates.
2¼-Yard Marion diesel caterpillar shovel. Two duplicates.
2-Yard Bucyrus caterpillar steam shovel. Two duplicates.
35 Ton McMyler eight wheel steam locomotive crane.
5-Yard Western two way side dump cars, steel underframe, heavy duty, 36" gauge. Fifty cars available.
21 Ton Vulcan four wheel saddle tank locomotive, 36" gauge, 11x16" cylinders.
40 Ton American four wheel saddle tank locomotive, 14x22" cylinders. Four duplicates.
40 Ton Vulcan four wheel saddle tank locomotive, 14x20" cylinders.
30 Ton American four wheel saddle tank locomotive, 12x18" cylinders.

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BIRMINGHAM, ALABAMA

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Multirap 3'x5' 1-deck, wet or dry screening
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3 Hummers, 4'x5' 2-deck, with V16 vibrators
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Huron 4'x8' 3-deck, with V belt 7½-hp motor

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Motor Driven Centrifugal Pumps

14" Allis Chalmers, 6950 GPM, 102' head
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10" Allis Chalmers, 4650 GPM, 82' head
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10" Allis Chalmers, 3150 GPM, 40' head
8" Allis Chalmers, 2080 GPM, 38' head

Each driven by 3 phase, 60 cycle, 220 or 440 volt motor. Excellent condition. Low price.

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4'-0" dia. x 30'-0" long Rotary Dryer, practically new, reasonably priced.

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Motors and Generators. A.C. and D.C., for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

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Condition nothing extra — 1 cu. yd. clamshell. 90 foot boom. 40 foot mast. 3 drum hoist.

POWER—60 HP ELECTRIC MOTOR

ARKHOLA SAND AND GRAVEL CO.
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Portable and stationary, belt with elec. or gas power, sizes from 20 cu. ft. to 1,000 cu. ft.

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1—150 ton 3 cpt. Blaw Knox; 1—118 ton Blaw Knox; 2—85 ton Heltzel; 1—72 Blaw Knox; 1—46 yd. Johnson offset; 1—60 ton Butler V-40; 2—35 ton Blaw Knox; 1—26 ton Heltzel with Kron dial scale. All above with or without volume or weigh batchers.

2—Cement Plants: 1—1,200 bbl. Blaw Knox; 1—275 bbl. Johnson, portable.

BUCKETS

26—Clamshell, all sizes and types; Williams, Blaw Knox, and Owen.

6—Dragline: 1—1¾ yd. Northwest; 1—1½ yd. Omaha; 1—1¼ yd. Page; 2—1 yd. Hayward; 1—¾ yd. Page; 1—1½ yd. Pioneer Cableway Excavator bucket.

8—Dragscraper: 2—1 yd. Sauerman; 1—1 yd. Green; 1—⅝ yd. Garst; 2—½ yd. Garst; 1—⅜ yd. Sauerman.

CONVEYORS & ELEVATORS

3—Barber-Green steel frame belt conveyors: 1—24"x156'; 1—18"x60'; 1—18"x45'.

11—Bucket elevators: Rex and Weller, on chain or belt; all sizes.

CRANES, DRAGLINES & SHOVELS

1—Page, Model No. 411 Diesel crawler dragline, 70' boom, 2 yd. bucket.

1—P & H Model No. 650, Serial No. 4188, 65' boom; 1¼ yd. bucket.

1—Link-Belt K-42, combination shovel, crane and trench hoe, Serial No. 1265, 1¼ yd. shovel front, 60' crane boom.

2—Northwest, Model 105, Serial No. 2053 & No. 1522 40' boom, 1 yd. bucket.

1—Link-Belt, K-1, Serial No. 1024, 50' boom, 1 yd. bucket.

2—Osgood Heavy Duty, Serial No. 2069 & No. 2087, combination 1 yd. shovel and crane, 40' boom.

1—Moore Speed Crane, Serial No. 179, 60' boom, 1 yd. bucket.

2—Thew, Model "S" combination shovel crane and dragline, Serial No. 2801 & No. 2687, ⅝ yd. shovel fronts, 40' crane boom.

1—P & H Model No. 206, 40' boom, ⅝ yd. bucket.

1—Byers Bearcat, Serial No. 3299, 30' boom, ½ yd. bucket.

CRUSHERS

4—Jaw Crushers: 1—12x36" Champion; 1—10x20" Climax No. 2½; 1—9x16" Telsmith No. 9-A; 1—9x15 Champion.

3—Gyratory: 1 No. 5 Gates; 1 No. 3 McCully; 1 No. 0 McCully.

1—Set of Allis Chalmers, smooth type crushing rolls, 42x16".

TRACTORS AND SCRAPERS

4—13 yd. LeTourneau Type RY scrapers with Caterpillar RD8 Diesel tractors, new 1938.

WHIRLEY

1—Mod. 75 Wiley Whirley No. 2973, 20 tons cap., 75' boom. 3D. Clyde 80 HP elec. hoist & 30 HP elec. swinger, all complete. Perfect condition.

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Telsmith 6-B Primary Gyratory Crusher
Traylor 8" Gyratory Bulldog Crusher
Jeffrey 15"x8" Swing Hammer Mill
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2—1-yd. Open Bottom Dragline Buckets
¾-yd. Blaw-Knox Clamshell Dig. Bucket
½-yd. Hayward Clamshell Mat'l. Bucket
½-yd. Sauerman Cresc. Dragline Bucket
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800-hp. Patterson-Kelley Hot Water Heater

G. A. UNVERZAGT
15 Park Row, New York City

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Reconditioned pipe, new threads and couplings, all sizes, ¾ in. to 36 in., guaranteed suitable for all practical purposes.

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Besser Master Tamper with downface block machine. Practically new. Make us an offer.

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230 N. Fifth St. Coshocton, Ohio

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RELAYING RAILS—25,000 tons—All Sections—All Sizes, practically as good as New.
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2—Lidgerwood with swingers & 30 H.P. G.E. motors, $1100.00 each
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3—Sullivan 310' displacement, $650.00 each
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2—6" Sterling, $400.00 each
2—4" Sterling, $200.00 each
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3—3" Rex, $100.00 each

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2—20 ton American Terry No. 3 Guy Derricks, 90' boom, 80' mast, complete with guys and fittings, $1500.00 each.
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Serving the Construction Industry for 47 years
Locust Ave. & E. 135th St., New York, N. Y.

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1—1 Yd. Northwest Shovel-Dragline.
1—2 Yd. Dragline Bucket.

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BULK CEMENT UNLOADER: Fuller Kinyon, portable self-propelled, with built-in motor, 40 H.P. A.C., complete.
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CRUSHER SPECIALS: Two 24x36, one 13x30 Jaw Crushers. One Kennedy 25 Reduction Crusher, with 50 H.P. Vertical motor, V belt drive.
CRUSHER ROLLS: Two 16x36, one 16x42, one 24x54.
BELT CONVEYOR: One 48" Belt with mechanical parts for 680 ft. of conveyor.
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PULVERIZER: One Sturtevant No. 1 Ring Roll Mill.
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30x60 Fairmount & 36x16 Allis Chalmers.

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10x8, 12x7½, 14x7, 15x9, 15x10, 16x9, 16x12, 16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 24x12, 30x15, 30x13, 36x15, 36x30, 36x18, 36x14, 36x9, 24x6, 24x10, 36x24, 42x9, 48x42, 48x36, 60x42, 84x66, 36x16, 9x36.

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Farrel No. 23B Practically New

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REDUC. TYPE: Kennedy Nos. 25, 37 & 49. Telsmith 3-F & 40. Traylor 36" TZ, 8", 10", 12" Super. McCully 6" & 10". Newhouse 5, 7 & 10". Symons Cone & Disc Ty. 2' to 4'.
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15" Electric Steel Hull Portable Dredge
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Koehring Chain Crowd

is a single continuous chain traveling *inside* of the high strength, welded boom. Chain tension is automatically maintained regardless of boom movements. Design and location of sprockets permits the sprocket centers to move without change in center distance. No back lash or slapping chains to cause drum shocks. Boom is quickly lowered or raised without manual adjustments or affect on crowding effort. Crowding action is positive and absolutely independent of the pull on the hoist line.

THE KOEHRING COMPANY
MILWAUKEE • WISCONSIN

The crowd chain leads in a straight line from a sprocket on the shipper shaft down under the boom foot sprockets and up to a halved sprocket bolted to the skeleton drum on the front drum shaft.

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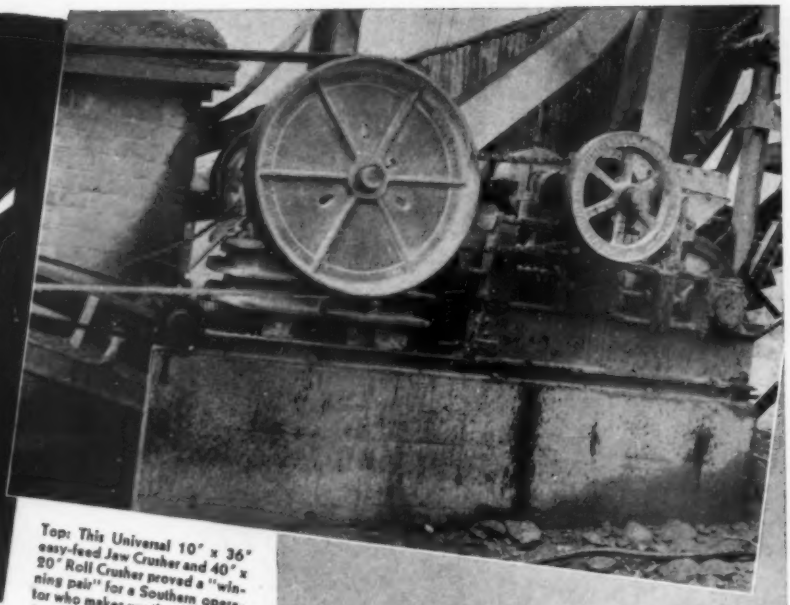
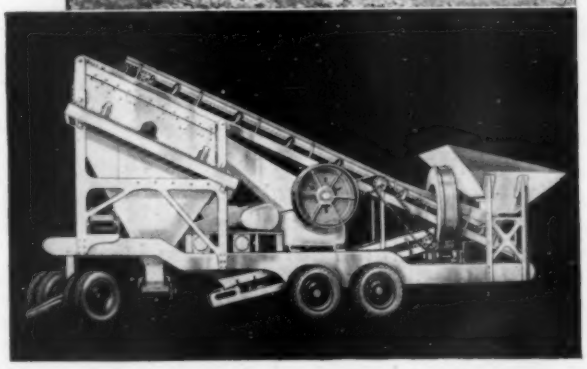
A Winning Pair!



Top: This Universal 10′ x 36″ easy-feed Jaw Crusher and 40″ x 20″ Roll Crusher proved a "winning pair" for a Southern operator who makes worthwhile profits on every ton.

Right: It's up high, but rock crushing costs are low with this 24″ x 36″ Crusher at a Montana quarry. The screen is a 4′ x 10′ Universal.

Below: The new Universal Portable Duplex Plant with the Universal Rotavator which helps to cut size and weight and increase efficiency and capacity of this gravel plant.



Universal Jaw Crushers and Secondary Roll Crushers are a winning pair in any quarry or pit. With their fast, dependable crushing to uniform size and low maintenance cost, you can't lose.

With over 33 years of experience building rock crushing equipment exclusively, Universal engineers know what it takes for profitable operation and you get it in every Universal Equipment.

Universal builds stationary and portable crushing, screening and washing plants for gravel or any rock from limestone to trap; also pulverizers, scrubbers, sand drags and bins.

Universal Advisory and Planning Service and fast Replacement Parts Service from 15 strategic points is another "winning pair" you should not overlook in contemplating new equipment.

Write for bulletins on various equipment or new complete catalog.

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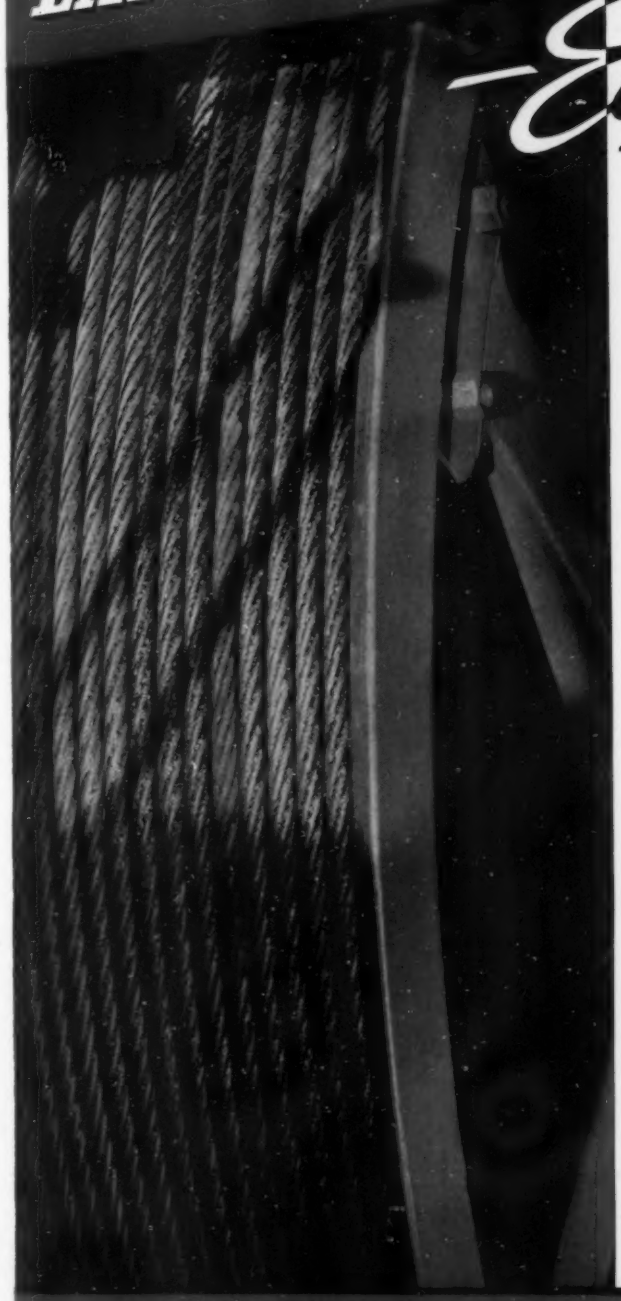
LAY-SET *Preformed* WIRE ROPE

—*Economizer*



GREEN SIGNIFIES SAFETY

Wherever it is necessary to have economy of operation, increased service from machinery, greater speed of production, or increased safety to workmen—there LAY-SET Preformed Wire Rope is most appreciated.

● Hazard LAY-SET is the all-around economizer because it is most carefully preformed. Before the strands in LAY-SET Wire Rope are finally assembled they are preformed to the exact helical curve they must assume in the finished rope.

● But the preforming process does far more than put all strands in perfect balance. It makes LAY-SET more flexible, limber—easier to handle. It bends around drums and sheaves easily; spools tightly under any load; has remarkable resistance to fatigue. LAY-SET Preformed resists kinking; may be spliced easier and with more certainty. Obviously, LAY-SET Preformed lasts longer—gives greater dollar value.

BUY ACCO QUALITY *whether for Hazard Wire Ropes —American Chains (Weed Tire Chains—Welded or Weldless Chain)—Campbell Abrasive Cutting Machines —Page Chain Link Fence—Page Welding Wire—Reading-Pratt & Cady Valves—Wright Hoists or any other of the 137 ACCO Quality Products.*

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